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Studies in the Botany of the Southeastern United States.—IX.

By John K. Small.

1. THE SESSILE-FLOWERED TRILLIA OF THE SOUTHERN STATES.*

In the spring of 1896, Professor Underwood and the writer independently became interested in a species of *Trillium* native in the southern Atlantic and the Gulf States.† Professor Underwood collected his material in Alabama, while I received specimens collected in western North Carolina, by my friend Mr. A. M. Huger.

The plant in question, judging both from descriptions and specimens preserved in our larger herbaria, has without exception been included in *Trillium sessile*. As I shall show, this is an error, and was committed by Linnaeus himself and both general botanists, and monographers of this group have apparently followed his disposition of the plants to the present time.

Without doubt the original *Trillium sessile* of Linnaeus‡ was a composite species, for after his description, "Trillium flora sessile erecto," he quotes descriptions from the three authors, Gronovius, Plukenet and Catesby, as follows:

* This study has been furthered by the loan of material from the herbaria of Harvard University and the United States Department of Agriculture.

† After extensive field observations during the spring and summer, Professor Underwood read a paper on the sessile *Trillia* before Section G of the American Association for the Advancement of Science at its last meeting. He expected to finish and publish the results of the study, but, being pressed for time, requested the writer to complete the work already well advanced.

‡ Species Plantarum, 340.

"Paris foliis ternatis, flore sessile erecto. Gron. virg. 44. Solanum virginianum triphyllum, flore tripetalo atropurpureo in foliorum sinu, absque pediculo, sessile. Pluk. alm. 352. t. 111. f. 6. Solanum triphyllum, flore hexapetalo: tribus petalis purpureis, caeteris viridibus reflexis. Catesb. car. 1. p. 50. t. 50."

The habitat given is "Virginia, Carolina." The first of these three descriptions throws little or no light on the subject, but the second and third quotations each refer to a plate. A comparison of these two plates indicates a great discrepancy, the figure of Plukenet representing a small plant with oval leaves, while the Catesby drawing illustrates a large robust plant with ovate-lanceolate leaves. If only these two plates had to be considered, there would be no doubt not only as to there being two distinct species involved, but we should have no trouble in deciding to which plant the name *Trillium sessile* must be applied. The first quoted description being wholly indefinite, left this important question in doubt. In order to settle this point definitely, Dr. Britton sent specimens of both the small and large plants to Mr. Edmund G. Baker, at the British Museum, and I can not do better than print his reply: "* * * * We have the Gronovian plant and also a plant in the Plukenet Herbarium, written up by Plukenet, but not the one apparently the figure was done from, as you will see from the tracing I enclose. The Gronovian and Plukenet plants are fairly similar and more like no. 2 (the small plant with oval leaves) than the much larger no. 1 (the large plant with ovate-lanceolate leaves). Neither of the specimens are particularly good ones, but I have tried to make tracings of them, such as they are, these will show the outline of the leaf if they do nothing else. You may like to have exact measurements of the Plukenet plant: Leaves broadly oval, 2 in. long, breadth $1\frac{7}{12}$ in., sepals $\frac{5}{6}$ in., petals $\frac{11}{12}$ in. * * * * ."

Thus we see that the first and second quoted descriptions in the Species Plantarum are represented by specimens which agree with each other in all essential particulars, while the third quotation is founded wholly on a plate, which represents a species totally distinct from that on which the first and second descriptions were founded. Therefore the name *Trillium sessile* must be associated with the small oval-leaved plant, and the large plant must receive a name, which will appear in the appended synopsis. The solution

of this ong-standing error naturally excited my interest in this whole group of *Trillium*, and a study of the different species leads me to print the following key and specific descriptions which, I hope, will lead to a better understanding of these interesting plants.

As far as I can see, this group of *Trillium* has always been very unfairly treated; most authors seem to have taken it for granted that the number of species was very limited and that that number could not be naturally increased. If an author did put his convictions in print, described a new species, pointed out excellent characters for a species and distributed specimens, that species was almost certain to find itself in synonymy or reduced to varieta, rank of another species at an early date. This state of affairs continued and reached a climax in Dr. Watson's treatment of the group in his revision of the North American Liliaceae,* where only two forms are given specific rank, while the rest are included in the synonymy or varietal ranks under a much distorted nomenclature, for example, *Trillium viride* Beck appears as a synonym of *Trillium sessile* L., *Trillium discolor* Wray appears as a variety of *Trillium sessile* under the new name *Wrayi*, *Trillium viridescens* Nutt. (*T. viride* Beck) also appears as a variety of the Linnaean species under the new name *Nuttallii* and *Trillium lanceolatum* Boykin mss. is set down as a variety of *Trillium recurvatum*, which is fortunate enough to have retained specific standing.

Key to the Species.

Petals sessile, of one color throughout.

Sepals oblong or oblong lanceolate; petals broadly spatulate.

1. *T. discolor.*

Sepals lanceolate; petals lanceolate, elliptic or oblanceolate.

Leaves oval or suborbicular, 4–8 cm. long; anthers 3–4 times longer than the filaments; styles elongated, nearly straight. 2. *T. sessile.*

Leaves ovate-lanceolate to ovate-orbicular, 8–18 cm. long; anthers subsessile; styles almost wanting, stigmas recurved. 3. *T. Underwoodii.*

Petals clawed, the blade and claw often of different colors.

Leaves sessile; blades of the petals linear or linear-oblong.

Stems rough pubescent at least above; leaves ovate or oblong; sepals 2.5–5 cm. long; filaments—$\frac{1}{4}$–$\frac{1}{3}$ shorter than the anthers. 4. *T. viride.*

Stems smooth; leaves lanceolate or elliptic; sepals 2–2.5 cm. long; filaments about as long as the anthers. 5. *T. lanceolatum.*

Leaves petioled; blades of the petals ovate, elliptic or obovate.

6. *T. recurvatum.*

* Proc. Am. Acad. 14: 213–303.

1. TRILLIUM DISCOLOR Wray; Hook. Bot. Mag. *pl. 3097.* 1831.*

Trillium sessile var. *Wrayi* S. Wats. Proc. Am. Acad. 14: 273. 1879.

Perennial by a rootstock, bright green, glabrous. Stems erect, 1–2 dm. tall, smooth; leaves oval, 6–7 cm. long, obtuse, or short-acuminate, 3–5-nerved, mottled, rounded at the base, sessile; flowers sessile; sepals oblong or oblong-lanceolate, 2 cm. long, obtuse or acute, spreading; petals broadly spatulate, about ⅓ longer than the sepals, greenish, sessile, rounded and one prominently apiculate at the apex; stamens less than ½ as long as the petals, the filaments nearly wanting; berry not seen.

Georgia.

Apparently a rare species and not lately collected, but very distinct, differing from all its relatives in the peculiar broadly spatulate petals, one of which is distinctly apiculate.

2. TRILLIUM SESSILE L. Sp. Pl. 340. 1753.

Perennial by an erect or ascending corm-like rootstock, deep green, glabrous. Stems solitary or clustered, erect, 1–2 dm. tall, slender; leaves oval or suborbicular, 4–8 cm. long, obtuse or acute, rounded at the base, sessile, 3–5 nerved, not mottled; flowers sessile; sepals lanceolate, 2–3 cm. long, acute or acutish; petals narrowly elliptic, slightly shorter than or longer than the sepals, sessile, acutish, purple; stamens about ½ as long as the petals; filaments dilated at the base, ⅓–¼ shorter than the anthers; styles elongated, nearly straight, berry not seen.

In woods, Pennsylvania to Minnesota, south to Florida and Mississippi. April and May.

3. TRILLIUM UNDERWOODII n. sp.

Perennial by a horizontal rootstock, bright green, glabrous. Stems solitary or clustered, 1–3 dm. tall, stout; leaves varying from ovate-lanceolate to ovate-orbicular, 8–18 cm., long, acute or short-acuminate, undulate, sometimes crisped, with a velvety lustre, mottled with 3 shades of green, rounded or subcordate at the base, sessile; flowers sessile, musk-scented; sepals lanceolate, 4.5–5.5 cm. long, obtuse or acute, erect or spreading, green or purplish-green; petals lanceolate, elliptic or oblanceolate, 5.5–8.5 cm. long, sessile, acute or obtuse, erect, purple; stamens 3–4 times shorter than the petals, filaments very short, anthers 1.5–2 cm. long, subsessile; styles almost wanting; stigmas recurved; berry ovoid.

*I am indebted to Dr. B. L. Robinson for a tracing of the original plate of *Trillium discolor.*

In woods and fields, North Carolina to Tennessee, south to Florida and Alabama. April and May. Ascends to 950 metres in North Carolina. *Trillium sessile* and *Trillium Underwoodii* are remarkably constant in comparative size. The two species can readily be segregated on size and habit alone and of course comparative measurements of organs would serve as an excellent basis of separation. But this is not necessary since we have such good specific characters as exist in the flower, especially as respects the stamens and styles.

4. TRILLIUM VIRIDE Beck, Am. Jour. Sci. 11: 178. 1826.

Trillium viridescens Nutt. Trans. Am. Philos. Soc. (II.) 5: 155. 1837.

Trillium sessile var. *Nuttallii* S. Wats. Proc. Am. Acad. 14: 273. 1879.

Perennial by a short corm-like rootstock, bright green, more or less pubescent. Stems solitary, or several together, 1–4 dm. tall, purple, rough-pubescent at least near the top; leaves oblong, ovate, or broadly ovate, 5–11 cm. long, acute or obtusish, 3–5-nerved, usually blotched, more or less pubescent on the nerves beneath, abruptly short-attenuate at the base; flowers sessile; sepals linear or linear-lanceolate, 2.5–5 cm. long, bright green, acute or obtuse, erect or spreading; petals clawed, the blades linear or nearly so, 2.5–6 cm. long, surpassing the sepals, light green or purplish green, acute or obtuse, on brown or purple claws; stamens about ⅓ as long as the petals; filaments flattened, ¼–⅓ shorter than the anthers; berry not seen.

In woods and glades, Missouri to Tennessee, south to Mississippi and Arkansas. April and May.

Prof. Beck published a good description of this species in the year 1826. Mr. Nuttall described an apparently extreme form of the same species eleven years later. With these two full descriptions and the original specimens of Mr. Nuttall extant, it seems strange that *Trillium viride* Beck, and *Trillium viridescens* Nutt., being one and the same species, should, on the one hand, be made a synonym and on the other a variety of a species to which it is only distantly related; the clawed petals, among many other characters, primarily prevent it being associated with *Trillium sessile*. Its true relationship is with *Trillium recurvatum*.

Mr. Nuttall collected the original specimens of *Trillium viri-*

descens in Arkansas, and of this collection there are good specimens preserved. Prof. Beck's plants came from St. Louis and, although I have not seen his original specimens, we have a specimen from the same place collected by Riehl in 1841, and, in addition to this, Mr. Henry Eggert has sent me excellent material from the vicinity of St. Louis collected during the past few years. All these plants, as well as those from the extremities of the known geographic range cited above, agree with each other in essential specific characters.

5. TRILLIUM LANCEOLATUM Boykin; S. Wats. Proc. Am. Acad. 14: 274. As synonym. 1879.

Trillium recuratum var. (?) *lanceolatum* S. Wats. Proc. Am. Acad. 14: 273. 1879.

Perennial by a rootstock, bright green, glabrous. Stems erect, 1–4 cm. long, slender, purplish, smooth; leaves lanceolate or elliptic, 7–9 cm. long, acute or acutish, more or less constricted at the base, sessile; flowers sessile; sepals linear or linear-lanceolate, 2–2.5 cm. long, acute, green, spreading; petals clawed, 3–3.5 cm. long, the blades linear or linear-oblong, acute, the claws about twice as long as blades; stamens about ⅓ as long as the petals; filaments about as long as the more or less incurved anthers; berry not seen.

In moist woodlands and river bottoms, Georgia to Alabama, and Louisiana. (?) April and May.

The following label accompanying Dr. Boykins' original specimen may be of interest: "*Trillium lanceolatum.* This is certainly a new species of sessile *Trillium.* It grows universally in stiff clayey river bottoms. Flowers March and April. The fruit is more bellied than S. Trillium, and deep grooving formed by the stamina, rendering it hexagonal. Stamina incurved."

6. TRILLIUM RECURVATUM Beck, Am. Journ. Sci. 11: 178. 1826.

Trillium unguiculatum Nutt. Trans. Am. Philos. Soc. (II.) 5: 154. 1837.

Perennial by a short horizontal rootstock, light green, glabrous. Stems solitary, or several together, 1–4 dm. tall, smooth, usually slender; leaves petioled, the blades ovate-lanceolate, oval or suborbicular, obtuse or acute, 5–9 cm. long, rounded or sub-cordate at the base or rarely attenuate, often mottled; petioles winged, several times shorter than the blades; flowers sessile, pur-

ple; sepals lanceolate, 2–3 cm. long, acute, finally deflexed; petals clawed, the blades ovate, obovate or elliptic, usually acute, about twice longer than the claws; stamens hardly ½ as long as the petals; filaments about ½ or ⅓ as long as the more or less incurved anthers; berry not seen.

In woods, Ohio to Minnesota, south to Mississippi and Arkansas. April and May.

2. NOTES ON CRITICAL SPECIES.

IRIS VERNA L. Sp. Pl. 39. 1753.

I have seen two collections of the spring Iris during the past season, both from North Carolina; the one was made by Mr. A. M. Huger in the mountains and the other by myself in the central part of the State. I find that two of its striking features have not been recorded: first, the remarkable elongation of the leaves, which often reach a length of 3–4 decimeters, and second, the odor of the flowers, which almost exactly imitates the fragrance of sweet violets.

ANEMONE TRIFOLIA L. Sp. Pl. 540. 1753.

While walking along a small stream just west of the Falls of the Yadkin river, last spring I was astonished to find fine plants of *Anemone trifolia*. The species has only been known to exist in America on the higher parts of the Alleghanies, chiefly in the Southern States, but here, in the central part of North Carolina at an elevation of only 200–300 feet above the level of the sea, the species appears as typical as anywhere.

CARDAMINE PARVIFLORA L. Sp. Pl. Ed. 2, 914. 1763.

Virginia seems to have been the southern recorded limit for this species but now Mr. A. M. Huger sends us good specimens from the mountains of Polk County, North Carolina.

DIAMORPHA PUSILLA Nutt. Gen. 1: 293. 1818.

The geographic range of this curious plant is gradually expanding. I have recently found the species at various points in northern Georgia and in 1894 and 1895 met with it on Dunn's Mountain in Rowan County, North Carolina. The outlying stations of its distribution as we have it represented by specimens are:

Cumberland Mountains, Tennessee, Prof. Kirby Smith.
Mountains of North Carolina, Mr. G. R. Vasey.
Habersham County, Georgia, Mr. Buckley.
Warren County, Georgia, Dr. Chapman.
Stone Mountain and vicinity, Georgia, various collectors.

WALDSTEINIA FRAGARIOIDES (Michx.) Tratt. Ros. Mon. 3: 107. 1823.

Like *Anemone trifolia* this is normally an Alleghanian species, but I have found quantities of it in the central part of North Carolina growing in dark ravines which branch from the cañon at the Falls of the Yadkin. The altitude of the locality is little over 150 feet.

OXALIS RECURVA Ell. Bot. S. C. & Ga. 1: 526. 1821.

During the summer of 1895 I collected a few specimens of this beautiful and strongly characterized *Oxalis* at Stone Mountain and in the vicinity of Augusta, Georgia.

MONOTROPSIS ODORATA Ell. Bot. S. C. & Ga. 1: 479. 1817.

This rare plant has lately been rediscovered by Mr. A. M. Huger on the mountains of Polk County, North Carolina.

SCUTELLARIA CAMPESTRIS Britton, Mem. Torr. Club. 5: 283. 1894.

In former papers of this series I have reported a number of typically prairie plants which occur east of the Appalachian mountain system; *Scutellaria campestris* must now be added to the increasing list. In April, 1896, I found several patches above the bluffs at the Falls of the Yadkin River, North Carolina. The latest record of its distribution is given by Drs. Watson and Coulter* as southern Illinois and Kansas. Both Prof. Bain and Mr. Bicknell have collected specimens in Tennessee. It is an excellent species and doubtless has a considerably wider range than our present material indicates.

3. NOTES ON EPILOBIACEAE.

The genus *Ludwigia* as it is now generally interpreted has always seemed to me to contain too many distinct generic types.

* A. Gray, Man. Ed. 6. 418.

I think Linnaeus' idea of holding *Isnardia palustris* generically separate from *Ludwigia alternifolia* is the proper way of disposing of these widely divergent species and their respective relatives. There are three clear generic lines in *Ludwigia* as it is limited by most authors and I think it is much more satisfactory to treat these groups as separate genera than to associate them as subgenera in a composite genus.

I append a synopsis which will serve to emphasize the diagnostic characters:

Leaves opposite; stems prostrate or decumbent, creeping or floating.
- Flowers sessile; petals wanting or very small; leaves petioled; capsules short, sessile, straight, with a flat or depressed top. 1. *Isnardia.*
- Flowers long-stalked; petals large and conspicuous; leaves sessile; capsules elongated, long-stalked, curved, with a prominent 4-lobed stylopodium. 2. *Ludwigantha.*

Leaves alternate; stems erect or ascending. 3. *Ludwigia.*

1. ISNARDIA L. Sp. Pl. 120. 1753.

Key to the Species.

Petals usually none; capsules 2.5–4 mm. long.
- Pubescent; capsules 2.5–3 mm. long. 1. *I. spathulata.*
- Glabrous; capsules 3–4 mm. long. 2. *I. palutris.*

Petals usually present; capsules 6–7 mm. long. 3. *I. natans.*

1. ISNARDIA SPATHULATA (T. & G.).

Ludwigia spathulata T. & G. Fl. N. A. 1: 526. 1840.
Around pine barren ponds, middle Florida.

2. ISNARDIA PALUSTRIS L. Sp. Pl. 120. 1753.

Ludwigia apetala Walt. Fl. Car. 89. 1788.
Ludwigia nitida Michx. Fl. Bor. Am. 1: 57. 1803.
Ludwigia palustris Ell. Bot. S.C. & Ga. 1: 211. 1817.
Isnardia palustris var. *Americana* DC. Prodr. 3: 61. 1828.
Isnardia ascendens Hall; Eaton & Wr. N. A. Bot. 285. 1840.
Ditches, streams and ponds, throughout eastern North America.

3. ISNARDIA NATANS (Ell.).

Ludwigia natans Ell. Bot. S. C. & Ga. 1: 518. 1817.
Streams and marshes, North Carolina to Florida and Mexico.

2. LUDWIGIANTHA.

[*Ludwigia*, section *Ludwigiantha* T. & G. Fl. N. A. 1: 526. 1840.]

1. LUDWIGIANTHA ARCUATA (Walt.).

Ludwigia arcuata Walt. Fl. Car. 89. 1788.
Ludwigia pedunculosa Michx. Fl. Bor. Am. 1: 88. 1803.
Isnardia pedunculosa DC. Prodr. 3: 60. 1828.
Swamps and marshes, Virginia to Florida.

3. LUDWIGIA L. Sp. Pl. 118. 1753.

Represented by fifteen species in the southern United States.

An ecological Study of the Genus Talinum with Descriptions of two Species.

BY J. W. HARSHBERGER.

(PLATE 299.)

There are admitted by Engler and Prantl in their voluminous work, "Die Natürlichen Pflanzenfamilien," seventeen genera of the family Portulacaceae, and, according to the Index Kewensis, the distribution of the species of these several genera is as follows:

Genus.	Number of Species.	Western Hemisphere including N. and S. America and Islands.	Eastern Hemisphere including Asia, Africa, Europe and Oceanica.
1. Talinum	30	25	5
2. Calandrinia . .	125	100	25
3. Spraguea . . .	2	2	—
4. Calyptridium. .	3	3	—
5. Talinopsis . . .	1	1	—
6. Pleuropetalon .	2	2	—
7. Grahamia . . .	1	1	—
8. Anacampseros .	12	—	12
9. Claytonia . . .	25	21	4
10. Hectorella. . .	2	—	2
11. Montia	—	—	—
12. Monocosmia . .	2	2	—
13. Silvaea	4	4	—
14. Portulacaria . .	2	—	2
15. Talinella . . .	1	—	1
16. Portulaca . . .	54	20	34
17. Lewisia	2	2	—
	268	183	85

It is at once apparent from an inspection of this table, that more than one-half of the genera are American, and of those found in the eastern hemisphere all are represented by species in the western hemisphere. Out of a total number of 268 species in 16 genera, 183 species are confined to the western hemisphere and 85 species to the eastern. The larger number of species of the eastern hemisphere, numbering some 71, belong to three genera *Calandrinia*, *Anacampseros* and *Portulaca*. Broadly speaking, the order Portulacaceae is an American order, and is interesting to the botanist morphologically, as well as ecologically. There is no more interesting genus from an ecologic standpoint than the genus *Talinum*.

It will be seen, if the American species of this genus are arranged geographically, that the greater number of well-defined species range from Cnili and Peru, where proportionally the greatest number of species is found, through Mexico where the genus is represented by at least 5 species to western North America to New Mexico and Texas.

Country.	Number of Species.
Chili	6
Peru	2
Venezuela	1
Am. trop	2
Mexico	5
Am. bor. occ	4
N. Mexico	1
Texas	2
Ind. or	1
Am. bor	3

The greater majority of the species of the genus *Talinum* range, therefore, along the backbone of the continent, and the species are discovered in greatest abundance in Mexico and western South America. A few species are isolated, and are separated from the main regiment as stragglers. *Talinum teretifolium* is one of these species, ranging over the eastern and central United States. From Prof. Thos. C. Porter, I learn that in the Herbarium of Lafayette College there are specimens of *Talinum teretifolium* collected in the following localities, in addition

to the commonly known one on the serpentine ranges of Chester County, Pennsylvania.

1. Dunn's Mt. and Roan Mountain, N. C. (Small.)
2. Sapulpa, Indian Terr. (B. F. Bush.)
3. Summit, Yonah Mt., Ga. (T. C. Porter.)
4. Sandy Barren, Oquaka, Ill.
5. Arena, Wisconsin.
6. Little-Stone Mt., De Kalb Co., Ga.
7. Rocky Knob, Caldwell Co., N. C.

The following observation by Mr. E. J. Hill is to the point.* *Talinum teretifolium* was found in 1832 on rocks above Taylor's Falls. "It is occasionally met with from Pennsylvania westward to Minnesota in our northern flora, being more common in Minnesota than elsewhere in this range of States." It has also been found at Miller's, Lake County, Indiana. In Illinois, it is found in sandy prairies and barrens. This disconnected distribution in isolated patches of country is hard to explain, unless we accept two propositions, both of which, or either of which may suffice as an explanation. 1. That its distribution as a species is due to the lightness of its seeds. 2. That being at one time a wide spread plant, it has been destroyed over the greater part of its range with the exception of a few localities, where it is still pretty abundant.

It is important also to draw attention to the distribution of the plant as influenced by the soil or rock formations. It is found abundantly in some places on the serpentine outcrops in Chester County, where I have observed its growth. These serpentine outcrops trend in a general southwesterly direction through Delaware and Chester counties, reaching their greatest extent in Pennsylvania on the Maryland line. These serpentine outcrops are essentially rocky oases, which have in some respects a peculiar flora. These barrens are characterized by the presence of the Red Cedar, *Juniperus Virginiana*, which, although scattered elsewhere in the neighborhood, is never so abundant, nor so closely grouped, as on these stony places. Not all of the serpentine barrens have the same association of species, for instance, *Cerastium oblongifolium* and *Talinum teretifolium* are not found on all of the serpentine ledges, but are localized to particular ones. So it is with other

* 1891. E. J. Hill, Botan. Gaz. 16 : 112. Notes on Flora of St. Croix Region.

associated species. They may be abundantly present in one spot, but absent in another. These facts make the study of the flora of the serpentine barrens especially inviting. According to Dana,* serpentine is a hydrous magnesium silicate like talc, but containing more water and less silica. It is of a green color, often clouded and has been made through the alteration of anhydrous magnesian silicates, as chrysolite. It is used as a building material in Philadelphia, the main college hall of the University of Pennsylvania being built of it. Because the plant *Talinum teretifolium* is confined in Eastern Pennsylvania to soil formed by the decomposition of serpentine rocks, it is interesting to inquire whether the chemical composition of the rocks has anything to do with its distribution, especially, as magnesium is so prominent an element in the rock's constitution. The first analysis of the plant made from meagre material by Dr. Owen Shinn of the Harrison Chemical Laboratory (Univ. of Pa.) led me to believe that such was the case. Farther analysis with more abundant material made by Prof. Henry Trimble, of the Philadelphia College of Pharmacy, led to a somewhat different opinion. His letter submitting the analysis is here quoted. "The overground portion contained so much water that there was not enough material in which to more than determine moisture and ash.

	Moisture	Ash in Absolutely Dry Substance.
Overground portion	86.65%	13.63%
Underground portion	24.12%	11.15%

"The ash of the underground portion consisted of potassium sulphate and potassium chloride, also calcium and magnesium phosphate, the magnesium phosphate being very abundant. The ash of the overground portion contained the same compounds, but apparently in different proportions from what there existed in the underground portion, potassium chloride being in this overground portion in great abundance. How this plant gets so much potassium from a magnesian soil is almost a mystery. Certainly it is interesting." It is known that potassium has to do with the formation of carbohydrates. If a plant does not find any potassium in the soil its growth ceases, and the leaves do not de-

* 1886. Dana, Manual of Mineralogy and Petrology (1894) 330.

velop the power of starch formation within the chlorophyll grains. As starch is stored abundantly in *Talinum teretifolium*, it may be that the potassium chloride plays this rôle, but this has not been certainly determined. It is interesting, however, to note that the phosphate of magnesium is present in the perennating stem, having been taken up by the roots. Whether its presence in the plant determines the plant's distribution is still a physiological enigma.

The plant has been recorded from other formations. Gray's manual says serpentine rocks. Upham* records it as occurring on ledges of rock (trap, syenite, granite and quartzite). It was found by Hill in the silicious sands at Miller's, Lake County, Indiana. In Illinois, it is found on sandy prairies and barrens. At Taylor's Falls, three other plants are associated with it on trap rocks, viz.: *Campanula rotundifolia*, *Selaginella rupestris* and *Cladonia rangiferina*. A mention of the habit of the plant in other places than southeastern Pennsylvania shows that *Talinum teretifolium* chooses many different soil formations, and the name of one locality Arena, Wisconsin, is suggestive.

Several species of the genus *Talinum* were found by me in Mexico this last summer growing on the bare faces of rocks. On the Cerrode Guadalupe, a rocky hill on the south front of which is situated the Holy Shrine of "Our Lady of Guadalupe" (Nuestra Senora Guadalupe) were found two species on the face of the weather worn rocks, namely *T. patens* and *T. aurantiacum*. These plants grew in an extremely dry situation, and exposed to the full blaze of the sun. The flat succulent leaves of *T. patens* were rolled up at their edges, so that the plant had a peculiarly curled appeared. This was no doubt an adaptation on the plant's part to meet the direct rays of the sun. The root of this plant is large, fleshy and succulent, and penetrates to a considerable depth (8–10 in.) into the crevices of the rocks. *T. aurantiacum* is consolidated more than *T. patens*, and has a strong swollen taproot, somewhat tuber-like in appearance. The leaves are linear, thick and grooved by two longitudinal grooves, as if the margin had been inflexed. Two other Mexican species *T. Greenmanii* and *T. napiforme* were discovered on exposed volcanic

* 1891. Upham, Botan. Gaz. 16: 112.

rocks. *T. Greenmanii* occurs on volcanic ground, Sierra de Ajusco, 8500 feet altitude; *T. napiforme* in the Pedrigal at Thapam, 7300 feet altitude. Both of these plants are succulent, consolidated and well adapted to stand the long periods of draught which are the rule in these volcanic regions. The roots penetrate into the volcanic pockets, where they find enough of soil for their needs. The leaves of both are terete, clustered at the base and surround a much abbreviated flower-stalk. It is interesting to note, that two other species of the genus, namely *T. confertiflorum*,* and *T. humile*,† are found in the Pinos Altos mountains, New Mexico. Another species, *Talinum spinescens*, is also adapted to dry situations, as shown by its dwarf habit and terete leaves. It was discovered by T. S. Brandegee on bare hills east of Ellensburgh, Washington.

Before describing the particular structure of *Talinum tereti-folium*, as determined by microscopic examination, it is expedient to describe the two species, one new, found by me this summer while botanizing with the veteran collector and botanist, Mr. C. G. Pringle.

1. Talinum napiforme DC.

Roots perennial, somewhat tuberous, 1–2 in. long, ½ in. broad, swollen with rounded button-like knobs and covered with corky scales of a dark brown color and bronze-like lustre; scales protective, root fibres long and rooting in the crevices of the rocks; acaulescent; leaves terete, smooth, waxy-green, flattened at base, rounded acute, 1–2½ in. long, clustered at top of root; scape 3–8 in. tall, cymosely many-flowered; bractlets small, sessile, acute; flowers small, ½ in. across; sepals 2;‡ petals 5,§ white veined with purple; stamens 5; ovary short, rounded; style short; stigma capitate, hispid; fruit small, ⅛ in. long, 3-cornered, sutural dehiscence; seeds small, black, spirally grooved. (Plate 299, fig. 3.)

Valley of Mexico, Tlalpam, Pedregal, growing on volcanic rocks. Resembling *T. confertiflorum* of E. L. Greene. Distributed in Pringle's Plantae Mexicanae as no. 6487.

2. Talinum Greenmanii n. sp.

Tap-root spindle-shaped, forked or straight, 2 in. long; acaules-

* E. L. Greene, Bull. Torr. Club, 8: 121.

† E. L. Greene, Bot. Gaz. 6: 183.

‡ Called bracts by Warming.

§ Called perianth by Warming.

cent, or with stem 1–2 in. long; leaves terete, 1–3 in. long, acute, green, clustered at top of short stem; inflorescence cymose not exceeding the leaves, branched with 5–8 flowers; sepals 2; petals 5; bright yellow; stamens 7–8, filaments long; ovary round; style short; stigma three-grooved; fruit rounded, triquetrous; seeds, small, smooth. (Plate 299, fig. 4).

Volcanic gravel, Sierra de Ajusco, Mexico. 8500 feet. Possibly it is *T. humile* described by E. L. Greene. Distributed in Pringle's Plantae Mexicanae as no. 6472. Named in honor of Mr. Jesse Moore Greenman, of the Gray Herbarium, Cambridge, Mass.

Talinum teretifolium belongs to that group of the genus with round leaves, as distinguished from those species which have leaves more or less flattened, as *T. patens, lineare* and *brevifolium.** *Talinum teretifolium* is interesting not only on account of its geographical distribution, but also from its significance from an histological and ecological standpoint. The stem is tuberiform, provided with closely appressed scale-leaves (induviae). During the active growing season, the perennating stem becomes more or less elongated, from which the green succulent stem arises bearing the terete foliage leaves. In the fall, just before the cessation of growth, rounded, tuberiform branches appear, which finally break from the main perennating stem as the plant withers. These small tuberous branches remain dormant during the cold of winter, their contents being protected by a thick corky layer until spring opens, when they give rise to new foliage shoots. One of these tuberiform branches, or stems, was planted in a pot January 21, 1896, and watered carefully to determine whether these branches propagated the plant non-sexually. On March 25, 1896, a green outgrowth appeared. By the end of March the green sprout had reached the height of an inch and had eight well-formed terete leaves. (See Plate 299, fig. 2). It is probable, also, that these ball-like branches aid in the distribution of the plant, rolling from place to place.

Histology. The root is long, and in cross section is surrounded with cork from six to eight layers thick. As the long, elastic roots are exposed frequently to the drying action of winds, this cork envelope becomes all the more necessary. Internal to the

*1893. Thomas Howell, A Rearrangement of American Portulacaceae. Erythea, 1: 34.

cork, the cortex is found surrounding the central bundle, or stele. The stem consists of two distinct regions, a lower induviate, perennating, cork protected portion, and an upper green foliage portion. The cork in the lower portion is many layers thick, and when sections are cut and mounted in acetic acid as a preservative, the cork cells are found, after the lapse of a year, to have undergone a change. The walls are found covered with peculiar yellowish beads in chains. The appearance which the walls assume reminds one strongly of a suberized cell-wall, which has been acted upon by potash. The cause of this beaded appearance in *Talinum* is not known. It is probably caused by the long action of the acetic acid.

The cortex of the lower perennating portion consists of parenchyma cells which are filled with starch, as a reserve material. If specimens of *Talinum teretifolium* are gathered when the active storing of starch begins, beautiful leucoplasts in which are imbedded compound, or aggregate starch grains are discovered. In the thicker stems, no chlorophyll is found, except in the region immediately beneath the corky envelope. The bundles of the tuberiform stem are collateral, the phloem is present as soft bast, which in the green foliage portion of the stems adds on the outside some bast fibres for support and strength. In the green portion, the cork has disappeared.

The bundles of the scape of *Talinum teretifolium* illustrate that the development of the various cells of the mechanical tissue is dependent upon the strain imposed upon them. Consequently, the bast fibres here become clearly accentuated and are of a glistening white color, closely investing the wood by a continuous ring. Beneath the epidermis, collenchyma for strength is also found.

The leaves are terete, 1–3 in. long, sessile with a flat base. In section, a leaf is somewhat crescentic at the base, the xylem portion of the vascular strand is toward the upper surface, and the bast toward the lower face. The bast fibres at the base of the leaf are conspicuous for strengthening purposes, and their cell-walls are of a yellowish tinge. A more distal section is the same as to the position of the elements, but the thickened bast elements are wanting. Beneath the epidermis, a zone of chlorophyll tissue

completely surrounding the leaf is seen, and if a section be cut near the apex, the chlorophyll is found to reach completely to the bundle, which is not the case farther down. The guard cells of the stomata are slightly sunken and, when viewed from above, are together somewhat ellipsoidal in shape.

The rounded succulent leaves with slightly depressed stomata and waxy bloom are well adapted to withstand the hot suns which beat in summer on the bare exposed ledges of serpentine in Chester county, Pennsylvania. Of *Talinum humile, confertiflorum, Greenmanii, napiforme, spinescens* with terete leaves, the same thing may be said. In the flat-leaved Portulacaceae, although the leaves are somewhat fleshy, the same adaptation is not so clearly marked.

A repetition of the observation made above on *Talinum patens* needs to be repeated at this point. I found this plant growing on a rocky hillside with a southern exposure called Cerrode Guadalupe in the Valley of Mexico. The leaves in the hot sun of midday were found more or less inrolled, thus giving to the plant a remarkably curled appearance. I have no doubt, although my observations did not extend long enough to fully justify the conclusion reached that, as in other plants, the leaves were inrolled as a protective adaptation. An observation of Mr. Meehan, on the night closing of the leaves of purslane, shows that such motions do occur in the Portulacaceae. Mr. Meehan notes* (Proc. Phila. Acad. Nat. Sci.) that in the list of plants having diurnal or nocturnal motion *Portulaca oleracea* does not appear. "At sundown the leaves at other times at right angles with the stem rise and press the upper surface against it. The morning ex' ansion begins with dawn, and soon after sunrise the leaves are fully expanded. Mr. Isaac Burk has observed the same thing, not only in *Portulaca* but also in an allied plant of the West Indies, *Talinum patens*." The last observation of Mr. Burk shows that in *T. patens* the motion of the leaves is effected either by the approach of night, or by too great illumination and heat. These facts are in line with the behavior of other plants, notably certain sensitive Leguminosae. Vilmorin says of this plant that "It keeps fresh in spite of heat and drouth, and will grow vigorously on unshaded rocks."†

*1882. Meehan, Bull. Torr. Club, 9 : 153.

† Les Fleurs de pleine Terre, 1124.

The inflorescence is a dichasium. In *Talinum teretifolium* it is t[illegible]l and much branched; in *T. napiforme* the stalks are thin and v[illegible]y; in *T. Greenmanii*, the inflorescence scarcely rises above the [illegible]aves.

The flowers in *Talinum teretifolium* are small (⅔ in. broad), with two sepals or, as some morphologists would have it, two bracts and five petals, or a five parted perianth with parts imbricately arranged. The petals are of a bright rose-purple, ephemeral; stamens 15–20; capsule globular, triquetrous, three-valved, many-seeded. The flowers open regularly at a definite time during the flowering period. Darlington, in his Flora Cestrica (3d ed. p. 35), says, "Flowers bright purple, appearing in succession opening in sunshine at midday for three or four hours, then closing and shriveling." Mr. Meehan observes the same thing more accurately. He finds* that its flowers always open regularly at 1 P. M.; though for one season they closed promptly at 2, and the next time between 2 and 5 P. M.† In order to finally decide the matter as to opening of the flowers in this species, a visit was paid by me to a serpentine outcrop near Westtown, Chester County, Pa., on June 24, 1896.

Observations on the spot, the day being warm and bright, showed me that the flowers opened between 12:30 and 1 P. M., when the flowers were visited by certain hymenopterous insects, namely the male of *Calliopsis flavipes* Smith, and the female of *Calliopsis andreniformis* Smith.‡

The other species of *Talinum* differ from *T. teretifolium*, as to the time of opening of the flowers, so that this peculiarity of the plants is specific. E. L. Greene says,§ with reference to *T. humile*: "The flowers at 2 o'clock P. M., had not yet opened, hence it is one of those species whose flowers open at evening and close in the morning." Prof. Trelease very kindly had one of his pupils make some observations for me on *Talinum patens* growing in the Missouri Botanical Garden. In a letter to me, dated Aug. 7, 1896, he says: "The flower was fully open at 3:15, and by 4:39

* 1881. Meehan, Bot. Gaz. 6. 280.

† E. J. Hill, Bot. Gaz. 16: 112.

‡ These insects were determined for me by William Fox, of the Academy of Natural Sciences, Phila.

§ Bot. Gaz. 6: 183.

nearly all of the flowers far enough advanced to open, had fully opened. At 6:00 P. M., none had closed. When the next observation was made at 7:30, nine-tenths of the flowers had closed, and by 7:45 all were closed."

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Explanation of Plate 299.

FIG. 1. *Talinum teretifolium*, showing induviate stem, and copiously branched dichasium.

FIG. 2. Tuberiform branch of *T. teretifolium*, produced in the fall of 1895, and sprouted in the spring of 1896.

FIG. 3. *Talinum napiforme* DC.

FIG. 4. *Talinum Greenmanii* n. sp.

Rarities from Montana.—I.

BY P. A. RYDBERG.

(PLATES 300, 301.)

ALLIUM FIBROSUM n. sp.

Bulb with a fibrous coating; stem 2–3 dm. high, subterete, somewhat striate; leaves flat, thickish, 3 mm. wide, 1–1½ dm. long; umbel with numerous bulblets and few flowers on pedicels about 1 cm. long; perianth-segments lanceolate-oblong, obtuse, 6 mm. long; filaments slightly dilated below, ¼ shorter than the segments, and a little longer than the style; anthers oblong; ovary evidently 6 crested, with short rounded crests. (Plate 300.)

This somewhat resembles *A. Canadense*, from which it is distinguished by the smaller size, the bright red bulblets, and the crests of the ovary. From *A. reticulatum* and *A. Geyeri*, it is easily distinguished by the presence of the bulblets. Collected on a high dry mountain side near Lima, Mont., June 29, 1895, by P. A. Rydberg, (no. 2606).

ALLIUM SIBIRICUM L. Mant. 562. 1767. (*Allium Schaenoprasum* β L. Sp. Pl. 301. 1753. *Allium Schaenoprasum* Authors.)

This has generally been confused with *Allium Schaenoprasum*, but it is evidently a good species. It is much taller than that plant, being generally 5–6 dm. high, has only one basal leaf and generally several stem-leaves, these thick, about 5 mm. in diameter, and broader perianth-segments. *Allium Schaenoprasum* is only 2–3 dm. high, and its base is surrounded by many narrow leaves.

In rocky places, Sweet Grass Cañon, Crazy Mountains. (Alt. 7000 ft., no. 349.) It has also been collected at Deer Lodge, July 9, 1895, by myself (no. 2601).

CALOCHORTUS ACUMINATUS n. sp.

Stem about 2 dm. high, with a secondary bulb in the axis of the first leaf; leaves 3–5 cm. long, very narrow and involute from a broader sheathing base; sepals narrowly lanceolate, scarious-margined, acuminate, equalling, or more often, exceeding the petals; petals white, rhombic, obovate or oval, acuminate, hairy at the base around the oval-oblong gland; filaments a little dilated, especially below; anthers linear, with slightly sagittate base, tapering a little upward, but not acute; stigma rather large and thick. (Plate 301.)

Dry Mountains, near Lima, P. A. Rydberg, no. 2600, Aug. 5, 1895.

It is apparently nearest related to *C. Nuttallii*, from which it differs by the longer sepals, longer and tapering anthers and the acuminate petals.

HABENARIA DILATATIFORMIS. (*Platenthera gracilis* Lindl. Gen. & Sp. Orch. 288. 1835–9. *Habenaria gracilis* S. Wats. Proc. Am. Acad. 12: 277. 1877. Not Hook. Exot. Fl. *pl. 135*. 1825.)

In general habit this most resembles *H. hyperborea*, from which it differs in the larger white flowers, in the lip, which is broadened at the base as in *H. dilatata*, although less so, and in the spur which is thickened at the end. From *H. dilatata* it differs in the less dilated lip and the shorter more saccate spur, which is slightly shorter than the lip.

Common in marshy places at an altitude of 5000–6000 feet. Spanish Basin by J. H. Flodman (nos. 360 and 361); also collected by P. A. Rydberg, in 1895, at Bozeman (no. 2607), and at Deer Lodge (no. 2608).

HABENARIA STRICTA (Lindl.). *Platentera stricta* Lindl. Gen. & Sp. Orch. 288. 1835–9.

This differs from the preceding in the greenish or purplish flowers, the narrower lip and the very short and much more saccate spur, which is scarcely more than one-half as long as the lip. *Habenaria saccata* Greene, Erythea, 3: 49, 1895, seems, from the description, to be the same. It is fairly common in swampy

places of central Montana. Spanish Basin, collected by J. H. Flodman (no. 362), and by myself in 1895, near Mystic Lake, no. 2609.

ALNUS SINUATA (E. Regel).

Alnus viridis β Hook. Fl. Bor. Am. **2**: 157. 1837.

Alnus viridis sinuata E. Regel in DC. Prod. **16**: Part 2, 183. 1868.

Shrub 1–5 m. high; young bark brown and glossy with scattered white lenticels; older bark grayish; leaves 3–10 cm. long, oval, acute or acuminate at both ends, sinuately lobed and doubly and sharply serrate, thin, green and glabrous on both sides, very glutinous when young, in age shining; peduncles racemiform, very warty; staminate catkins 2 cm. long, sessile; pistillate ones shortly ellipsoid, 8–10 mm. long and 6–7 mm. in diameter, on pedicels 3–15 mm. long.

It most resembles *A. viridis*, but is easily distinguished by the thinner, more shining leaves, which are always more or less lobed and quite without any development of pubescence. In *A. viridis*, the veins on the lower surface are more or less ferruginously puberulent. In the same species the pistillate catkins are generally over 1 cm. long. *A. sinuata* has also been confounded with *A. tenuifolia* Nutt., which, according to Sargent, is an older name for *A. incana glauca* Regel or *A. incana virescens* Wats. I have not access to Nuttall's Sylva and am not able to verify this point. In the plate of *A. tenuifolia* in the Silva of North America, the leaves resemble more the present species than *A. incana glauca*, but Prof. Sargent's description and synonomy belongs evidently to the latter. In *A. tenuifolia, i. e., A. incana glauca*, the leaves have much rounder lobes and less sharp dentations, are less acuminate, thicker, and generally somewhat pubescent on the veins. The pistillate catkins are, as a rule, nearly sessile on the common peduncle.

It is fairly common in the mountain regions of Montana. (Flodman, no. 369, Spanish Basin, July 10, 1896.) In the Columbia herbarium there are three specimens of this species, viz.: one collected by Mertens at Sitcha, one by Scouler (no. 59) from the Columbia, and one received from Hooker, but without any indication of collector or locality. Probably it was collected by Douglas.

URTICA CARDIOPHYLLA n. sp.

Urtica dioica (?) Rydberg, Contr. Nat. Herb. 3: 179. 1895.

Stem about 1 m. high, angled and striate and, as well as the leaves, nearly devoid of bristles; leaves broadly cordate, or the upper somewhat narrower, 6–10 cm. long, coarsely toothed, very thin, dark green, perfectly glabrous and shining; petioles about 3 cm. long, very slender; flower clusters small, rather few-flowered, in the specimens seen scarcely more than half as long as the petioles; stipules linear-lanceolate, 5–10 mm. long, very thin.

On a wooded creek bank, near Castle, Montana, Aug. 1, 1896, J. H. Flodman, no. 370. A specimen was collected by the author near Whitman, Neb., in 1893. In the report it was doubtfully referred to *U. dioica* (Rydberg, no. 1790). It is evidently near *U. gracilis*, from which it differs in the broader thinner leaves, the smaller flower-clusters and the nearly complete absence of bristles.

CORIOSPERMUM VILLOSUM n. sp.

Stem 2–4 dm. high, much branched from near the base, the branches divergent, striate, when young with the leaves and bracts villous with many branched hairs, in age glabrate; leaves linear, 2–4 cm. long, 1–3 mm. wide, cuspidate-mucronate; spikes rather dense, with more or less imbricated bracts; lower bracts linear-lanceolate, 5–10 cm. long, the upper ovate-acuminate and cuspidate, 4–5 mm. long and about 3 mm. wide with broad scarious margin; achene 2–2½ mm. long and 2 mm. wide, acutely margined but scarcely at all winged.

The following specimens belong to this species: *Montana:* P. A. Rydberg, no. 2623, 1895, from Manhattan, in flower. *Colorado:* Isabel Mulford, from Salida, in fruit. S. Watson, no. 993, from Carson Desert, Nevada, 1867, seems also to belong here.

There are at least three species of *Coriospermum* in the United States, viz.:

C. hyssopifolium L. with a low branching stem, more or less pubescent when young, very dense spikes with imbricated bracts, which are all broadly ovate, generally over 5 mm. long, and large achenes about 3½–5 mm. long and with broad wing margins. It grows around the Great Lakes and northward to the Arctic and westward to Washington.

C. nitidum Kit (*C. hyssopifolium microcarpum* Wats.), with tall slender perfectly glabrous stem, ascending branches, lax spikes,

whose bracts are not overlapping each other and are much narrower and shorter, 3–4 mm. long and generally narrower than the small, 2 mm. long, broadly winged achenes. I have compared the American form with the European and cannot find any character by which to separate it. It grows from Texas, Kansas, Nebraska to Arizona and Washington (?).

C. villosum, described above, which resembles *C. hyssopifolium* in the spikes and the low branching, and *C. nitidum* in the size of bracts and achenes and narrow leaves, but differs from both by the lack of the wing-margin and by the longer pubescence.

New or noteworthy American Grasses.—VI.

By Geo. V. Nash.

Paspalum bifidum (A. Bertol.)

Panicum Floridanum Trin. Mem. Acad. St. Petersb. (VI.) 3: Pt. 2, 248. 1834. Not *Paspalum Floridanum* Mx. 1803.

Panicum bifidum A. Bertol. in Mem. Acad. Sci. Bolog. 2: 598. *pl. 41. f. 2, e–h.* 1850.

Panicum Alabamense Trin.; Steud. Syn. Pl. Gram. 64. 1855.

Paspalum racemulosum Nutt.; Chapm. Fl. S. St. 571. 1860.

Paspalum interruptum Wood, Classbook, 783. 1861.

The above seems to be the oldest available name for this plant, the *Panicum Floridanum* of Trinius being excluded by the *Paspalum* of the same name previously published by Michaux. The excellent plate and description of Bertoloni, and the fact that his plant was from Alabama, leaves little to be desired in its identification. I have been unable to ascertain where Dr. Chapman secured the name of *P. racemulosum* Nutt. The publication by Nuttall of such a name I have failed to discover up to the present. The only name resembling that accredited to Nuttall by Chapman is *P. racemosum*, published by the former in the Transactions of the American Philosophical Society ((II.) 5: 145. 1837), but this is antedated by that of Lamarck. Nuttall secured his plant in southeastern Indian Territory, and just what he had I am as yet unable to determine. From a comparison of our plant with his description, I think it will become apparent at once that whatever plant he did have, it was some other than that which has

been known for so long as *Paspalum racemulosum* Nutt. The racemes in his species are described as "brevibus" and the rachis as "pilosis," neither of which characters are to be found in our plant, which has the racemes exceptionally long for this genus. "Clavellate receptacle of the flowers pilose" and "calix villous" are surely not descriptive of these parts in this grass, the spikelets of which are very glabrous and the pedicels only puberulent.

There is in the herbarium of Columbia University a specimen ticketed as follows: "'Panicum Alabamense' Trin. in lit. 11. Jul. 1832. Alabama, Dr. H. Gates, 1831." This is apparently in Dr. Torrey's hand writing, and is pretty clear evidence as to the plant of Trinius published by Steudel. I can discover no essential differences between it and *Paspalum bifidum*. The leaves are somewhat broader and the racemes more numerous, but the habit, character of the spikelets, racemes and pubescence, and its distribution are the same. Other specimens from the Gulf States are similar to the one labeled as above.

Judging from the description given by Prof. Beal in Grasses of North America (2: 87, 1896), I take the *P. racemosum* of that work, which he has accredited to Lamarck, to be this plant. I am at a loss to understand, if the description has been seen by him, why he should adopt this name, as a mere casual comparison of Lamarck's description with our plant would show the error of such a decision. The *P. racemosum* Lam., was originally published in his Illustrations (1 : 176), but a much more extended description, in which a reference is made to the first publication, is given in the Encyclopedia Methodique (5 : 32), where it is stated that the plant is remarkable for its branching culms, and, further, that the inflorescence is composed of a large number of short spikes, 40–50, and that the rachis is flat. He also remarks that his plant came originally from Peru. This would hardly describe the grass which I think Prof. Beal had in mind, in which the culms are never branching but always simple, the racemes unusually long for this genus and erect, and the rachis somewhat triquetrous and narrow but not flat. Moreover, one would hardly expect to find native in the southern Atlantic and Gulf States a plant which is indigenous to Peru.

PANICUM BICKNELLII n. sp.

Whole plant, with the exceptions noted below, smooth and

glabrous. Culms erect, or sometimes decumbent, slender, 2–4 dm. tall, at length somewhat branched, the lower internodes puberulent, the nodes sparingly barbed; sheaths generally longer than the internodes, ciliate on the margins, the lowermost pubescent; ligule a fringe of very short hairs; leaves elongated, increasing in length toward the top of the culm, erect, linear, acuminate at the apex, narrowed toward the ciliate base, scabrous on the margins, 7–9 nerved, the midnerve prominent at the base, the primary leaves 8–16 cm. long, 5–10 mm. wide, the uppermost one usually about equalling the panicle, the leaves on the branches shorter, the upper ones much exceeding the panicle; primary panicles ovate, 6–8 cm. in length, the main axis scabrous as are also the ascending slightly flexuous branches, the secondary panicle much smaller with usually appressed branches; spikelets obovate, obscurely pointed, 2.5–3 mm. long, the first scale broadly ovate or triangular, acutish, one-quarter as long as the spikelet, sparsely pubescent, 1-nerved, the second and third scales membranous, equal in length, 9-nerved, pubescent with short spreading hairs, the latter enclosing a hyaline palet about one-half its length, the fourth scale chartaceous, yellowish, oval, obtusely apiculate, enclosing a palet of equal length and similar texture.

The type specimens were collected by Mr. Eugene P. Bicknell, in whose honor I take pleasure in naming it, in Bronx Park, on July 21, 1895. It was also obtained by Dr. Thomas C. Porter, on the slate hills near Chambersburg, Pennsylvania, on July 30, 1896.

A most peculiar grass, resembling much in habit *P. depauperatum*, and evidently allied to it, but the leaves are much broader and of a different shape and the spikelets smaller and but obscurely pointed.

PANICUM BRITTONI n. sp.

Whole plant, with the exception of the spikelets, smooth and glabrous. Culms coarsely striate, densely caespitose, slender, erect, rigid, 1–2 dm. tall, simple or sparingly branched; sheaths closely embracing the culm, striate, less than one-half the length of the internodes; ligule a ring of short hairs, about .5 mm. long; leaves longer than the sheaths, the basal ones broadly lanceolate, more or less spreading, 1.5 cm. long or less, 3–4 mm. wide, those on the culm three in number, the middle one the longest, 1–3 cm. long, 1 5–3 mm. wide, strictly erect, acuminate at the apex, generally somewhat narrowed toward the rounded base, primary nerves 5–7; panicle broadly ovate, 2–3 cm. long, the branches spreading or ascending, the lower ones 1–2 cm. long, the ultimate divisions sparingly scabrous, twice as long as the spikelets or longer; spikelets obovoid, or nearly oval, obtuse, about 1.3 mm. long, the first scale about one-third as long as the spikelet, mem-

branous, usually purplish, glabrous or sparingly pubescent, acutish, the second and third scales equal in length, membranous, broadly oval, 7-nerved, densely pubescent with slightly ascending hairs, the third scale enclosing a hyaline palet about one-half its length, the fourth scale chartaceous, yellowish, oval, obtusely apiculate, enclosing a palet of equal length and similar texture.

In moist sand in the "pine barrens" at Forked River, N. J. Collected by Dr. Britton during an excursion of the Torrey Botanical Club to that region May 29–June 2, 1896.

PANICUM CILIIFERUM n. sp.

Culms caespitose, 2–8 dm. tall, erect, at length much branched and decumbent, hirsute, except a naked ring below the barbed nodes, with ascending or nearly appressed hairs, which are usually more scanty at the summit or nearly wanting. Sheaths papillose-hirsute with ascending or nearly appressed hairs, the basal ones crowded, the remainder shorter than the internodes; ligule a ring of hairs about 1 mm. long, often with an upper supplemental row of much longer hairs; leaves rough and pubescent on the lower surface with short rigid appressed hairs, at least at first, the upper surface smooth and glabrous, or sometimes a few scattered long hairs near the base, ciliate with ascending hairs, 9–11-nerved, rounded at the base, acuminate at the apex, oblong-lanceolate to lanceolate, erect or ascending, those toward the base of the culm more and more spreading, shorter and broader, the primary leaves 2.5–9 cm. long, 3–12 mm. wide, those on the branches 6 cm. long or less, 2–5 mm. wide; mature primary panicle broadly ovate, 7–9 cm. long, 6–10 cm. wide, the branches spreading or slightly ascending, the longer 5–6 cm. in length, the panicles on the branches much smaller and exceeded by the leaves, with the bases included; spikelets obovate, somewhat acute, 3 mm. long, the first scale glabrous, about one-half as long as the spikelet, 1–3-nerved, acute or obtuse, or sometimes 3-toothed, the second and third scales equal in length, 9-nerved, strongly pubescent with somewhat ascending hairs, the latter scale enclosing a hyaline palet about one-half its length, the fourth scale chartaceous, oval, obtusely acute, enclosing a palet of equal length and similar texture.

Type collected by the writer in the "high pine land" at Eustis, Lake Co., Florida, March 12–31, 1894, no. 147. Nos. 27, 75, 79, 94, 96, 103, 1118, 1231, and 1518 of the same collection also belong here; as well as no. 1857, collected in the same place in 1895, and well representing the late and much-branched state.

The harsher papillose pubescence, the broader and shorter

leaves, glabrous above, and the larger more open panicle readily separate this from *P. malacon*, which is described below.

I was at first inclined to consider this the *P. ovale* of Elliott, but after a careful comparison with the description and with a specimen so named by Elliott, I feel justified in the above disposition of it.

PANICUM GLABRIFOLIUM n. sp.

Whole plant, except just below the lower nodes, smooth and glabrous and somewhat shining, especially the panicle and spikelets. Culms caespitose, 1.5–4 dm. tall, erect, rigid, slender, leafy to the top, the longer culms pubescent for a greater or less distance below the lower nodes, at length somewhat branched; nodes purplish, the lower ones generally upwardly barbed; sheaths strongly striate, the lowermost ones pubescent, particularly at the base, 3 cm. long or less, closely embracing the culm, a tuft of hairs on each margin at the apex; ligule a fringe of hairs .5 mm. long; leaves narrowly linear, 7–9-nerved, erect, rigid, thickish, long acuminate, narrowed toward the base, those on the sterile shoots 15 cm. long or less, 3–4 mm. wide, those on the fruiting culms 3–9 cm. long, 1–3 mm. wide; panicle ovate, 4–6 cm. long, 3–4 cm. wide, its branches spreading or somewhat ascending, single, the longer branches about 2 cm. long, bearing 3 or 4 distant ultimate divergent divisions which are 2–6 times as long as the spikelets; spikelets slightly exceeding .5 mm. in length, tinged with purple, obovate, the first scale less than one-half the length of the spikelet, membranous, orbicular-ovate, obtuse, 1-nerved, the second and third scales broadly oval, membranous, 5–7-nerved, the latter enclosing a hyaline palet one-half its length, the fourth scale oval, chartaceous, white, enclosing a palet of equal length and similar texture.

Collected by the writer in the "flatwoods" at Tampa, Florida, on August 20, 1895, no. 2415a. It grows in dense tufts, the long narrow erect leaves and the wiry culms giving it a striking appearance.

PANICUM LINDHEIMERI n. sp.

Whole plant, with the exception of the lower sheaths, usually the lower internodes, and the spikelets, smooth and glabrous. Culms slender, erect, at length branched, the lower internodes sparingly papillose-hirsute, or sometimes glabrous; nodes often barbed with spreading or somewhat reflexed hairs; sheaths shorter than the internodes, somewhat loosely embracing the culms, ciliate on the margins, the lower ones sparingly papillose-hirsute; ligule a fringe of hairs about 2 mm. long; leaves ascending, 2–7 cm. long,

4–12 mm. wide, thickish, narrowly oblong-lanceolate, acute at the apex, rounded or truncate at the somewhat clasping base, 7–9-nerved, the margins scabrous; primary panicle orbicular-ovate, 4–5 cm. long, its branches spreading, the longer 2–3 cm. long, single, dividing at or near the base into 3–5 branches which subdivide into 1–3 branchlets, these usually appressed ultimate divisions rarely exceeding twice the length of the spikelets, the secondary panicles somewhat smaller; spikelets obovate, 1.5 mm. long, the first scale about one-third as long as the spikelet, white, glabrous, broader than long, rounded or almost truncate at the apex, sometimes slightly apiculate, 1-nerved, the second and third scales equal, membranous, yellowish green, broadly oval, 9-nerved; strongly pubescent with spreading hairs, the latter enclosing a hyaline palet one-half its length, the fourth scale chartaceous, broadly oval, yellowish white, enclosing a palet of equal length and similar texture.

The type was collected by F. Lindheimer in 1846, no. 565. The following also are to be referred here:

Heller, Kerrville, Kerr Co., Texas, 1894, no. 1752.

Nealley, Base of House Mt., McCulloch Co., Texas, June, 1890.

Wright, New Mexico, no. 2085.

PANICUM MALACON n. sp.

Whole plant often purplish, pubescent with white ascending hairs, those on the sheaths and culms longer, scantier on the upper sheaths and the upper part of the culms, the pubescence of the surfaces of the leaves dense and short. Culms caespitose, at first simple, erect, later branching at all the nodes and decumbent at the base; nodes barbed with spreading hairs; sheaths loosely embracing the culm, shorter than the internodes in the simple state, in the branching condition much crowded; ligule a fringe of hairs about 1 mm. long; leaves firm, rigid, sometimes sparingly ciliate, linear, acuminate at the apex, truncate or somewhat rounded at the base, 5–9-nerved, the midnerve prominent on both surfaces, the primary leaves 3–11 cm. long, 3–7 mm. wide, ascending, or the upper ones erect, those on the branches strictly erect, 5 cm. long or less, 3–4 mm. wide; primary panicle but little exserted, 7–10 cm. long, 2–4 cm. wide, its branches ascending or erect, the ultimate divisions 3–10 times as long as the spikelets, appressed to the branches, capillary but rigid, the lower and longer branches 4–6 cm. long, usually more contracted than those on the upper part of the panicle; spikelets obovate, a little exceeding 3 mm. in length, the first scale more or less pubescent, about one-half as long as the spikelet and 3–5 nerved, acute, the second and third scales membranous, equal, 9-nerved, densely pubescent with ascending hairs, the latter scale enclosing a hyaline palet about

one-half its length, the fourth scale chartaceous, oval, enclosing a palet of equal length and similar texture.

Collected by the writer in the "high pine land" at Eustis, Lake County, Florida, May 1–15, 1894, no. 628, and distributed as *P. pauciflorum* Ell. It appears quite distinct from a specimen of that species, so named by Elliott, preserved in the herbarium of Columbia University, the character of the pubescence and the spikelets serving well to distinguish it.

PANICUM MALACOPHYLLUM n. sp.

Whole plant, except the leaves, papillose-hirsute with rather soft long spreading hairs. Culms 4 dm. tall or less, erect, at length branching toward the summit; nodes densely barbed with reflexed hairs; ligule a ring of hairs about 1 mm. long; sheaths shorter than the internodes, loosely embracing the culms; leaves erect or ascending, narrowly oblong-lanceolate, narrowed toward the rounded base, acuminate at the apex, softly pubescent on both surfaces, rough on the margins, 7-nerved, the primary leaves 5–8 cm. long, 4–11 mm. wide, the leaves of the branches 4 cm. long or less, 3–5 mm. wide; panicle slightly exserted, ovate, 3–5 cm. long, the branches spreading, somewhat flexuous, the lower 1.5–2 cm. long, bearing 4–8 spikelets on pedicels shorter than themselves; spikelets obovate, 3–3.5 mm. long, acute, the outer three scales membranous, densely pubescent with long spreading hairs, the first scale orbicular-ovate, acute, about two-fifths as long as the spikelet, 1-nerved, the second and third scales equal in length, broadly oval, 9-nerved, acute, the latter enclosing a hyaline palet about one-half its length, the fourth scale chartaceous, broadly oval, yellowish white, enclosing a palet of equal length and similar texture.

Type collected by Mr. B. F. Bush on May 19, 1895, at Sapulpa, Indian Territory, no. 1228. The grass secured by Dr. Edward Palmer in 1868, on the False Washita, between Fort Cobb and Fort Arbuckle, Indian Territory, no. 383, belongs here. Dr. Gattinger also obtained it in the cedar barrens of Tennessee, in May, 1880.

This appears to be sufficiently distinct from *P. Scribnerianum* to warrant giving it specific rank. Its more slender habit, the long hirsute pubescence of the culm and the panicle, including its branches and pedicels, the densely barbed nodes, the softly pubescent leaves, and the somewhat smaller acute spikelets which are densely pubescent with hirsute hairs, appear to make the above disposition of the plant necessary. In *P. Scribnerianum* the pu-

bescence is much more rigid, the culm and panicle glabrous, or rarely with a few scattered hairs, and the leaves and spikelets glabrous, or the latter occasionally somewhat pubescent with shorter hairs.

Dr. Palmer's no. 382, collected probably in the same locality as his no. 383, referred to above, is *P. Scribnerianum*, and strikingly shows the differences, already noted above, between this and *P. malacophyllum*, when growing in the same region.

PANICUM NEURANTHUM Grisebach, Cat. Pl. Cub. 232. 1866.

There is no doubt as to the occurrence of this species in the United States, its range extending, so far as the specimens to which I have had access indicate, from southeastern Virginia, thus bringing it into the region covered by the Illustrated Flora, to Florida, and westward to Louisiana.

Grisebach based his species on Wright's Cuban Collection no. 3453. This exactly matches the plant collected by A. H. Curtiss, in Duval Co., Florida, no. 3567*, and also my no. 1243, secured at Eustis, in the same State, during July, 1894.

I would refer to this species, in addition to those already cited above, the following:

N. L. Britton, Virginia Beach, Va., Sept. 10, 1895.
Ravenal, Aiken, S. C., May 28, 1867.
J. K. Small, near Valdosta, Lowndes Co., Ga., June 6–12, 1895.
J. H. Simpson, Sanibel Island, Fla., March, 1891, no. 298.
Chapman, Appalachicola, Fla.
S. M. Tracy, Ocean Springs, Miss., Aug. 3, 1889, no. 421.
C. L. Pollard, Biloxi, Miss., July 1, 1895, no. 1417.
Drummond, New Orleans, 1832.

Curtiss' plant, and also my own, both cited above, well represent the late and much branched state, while Simpson's no. 298, and the plant collected by Ravenal, both also alluded to above, present the state of the plant in its early and simple condition.

This is closely related to *P. angustifolium* Ell., a specimen of which, so named by Elliott, is in the herbarium of Columbia University. The smaller obtuse spikelets which are broader in proportion to their length and the branches of the primary panicle remaining contracted for some time readily separate it from the *P. angustifolium* Ell., in which the spikelets are acute and con-

siderably larger, and the primary panicle branches not remaining contracted, but spreading at once.

As this grass is apparently quite common, there may be an older name than the above, but up to the present search has failed to reveal it. When a proper disposition is made of the species of Elliott and Michaux, and some of the other early southern botanists, some name among them may be found to apply to this plant. There can be no doubt, however, as to this grass being the *P. neuranthum* of Grisebach, for, as stated above, it exactly matches the form upon which he based the species.

PANICUM ANGUSTIFOLIUM Ell. Bot. S. C. & Ga. 1: 129. 1817.

P. neuranthum var. *ramosum* Griseb. Cat. Pl. Cub. 232. 1866.

As stated above, this appears to be clearly distinct from *P. neuranthum* Grisebach. The specimen on which Grisebach based his variety *ramosum*, no. 3454 of Wright's Cuban Collection, matches the late and much branched condition of Elliott's *P. angustifolium*, well represented by Curtiss' nos. 4028 and 4678. In addition to those cited already, I would refer the following to this species:

Vasey, Norfolk, Va., in pine woods, 1884.

Ravenal, Aiken, S. C., June 1, 1867.

M. A. Curtiss, N. C.

A. H. Curtiss, Florida, Duval Co., no. 3583*; Jacksonville, nos. 4028 and 4678.

Nash, Eustis, Florida, 1894, nos. 319, 560, 598, 926, 1226, 1425 and 1436; 1895, no. 1856.

S. M. Tracy, Mississippi, Crystal Springs, no. 117; Biloxi, no. 3091.

Langlois, Louisiana, October 1, 1890.

PANICUM POLYCAULON n. sp.

Plant yellowish green, with the habit of *P. ciliatum* Ell., smooth and glabrous, excepting the margins of the sheaths and leaves, and the axis of the panicle which is sparingly pilose. Culms densely caespitose, the upper portion naked, 2 dm. tall or less, erect, simple, or at length somewhat branched; sheaths coarsely striate, ciliate on their margins, the lower loose, 2.5 cm. long or less, the uppermost one longer than the remainder; ligule a ring of very short hairs; leaves erect or ascending, narrowly oblong-lanceolate, 2–7 cm. long, 2–8 mm. wide, somewhat narrowed toward the rounded base, acuminate at the apex, ciliate

on the margins with somewhat ascending hairs, 7–9-nerved, the mid-nerve prominent; panicle broadly ovate, 3 cm. long or less, its branches spreading or ascending, their ultimate divisions several times longer than the spikelets, the main axis and usually the lower branches sparingly pilose; spikelets about 1.5 mm. long, divergent from the branches of the panicle, obovate, obtuse, the first scale about one-half as long as the spikelet, thin membranous, orbicular-ovate, obtuse, 1–nerved, the second and third scales equal in length, membranous, broadly oval, 7-nerved, the latter enclosing a hyaline palet about one-half its length, the fourth scale chartaceous, oval, white, enclosing a palet of equal length and similar texture.

Type specimen collected by the writer on Aug. 20, 1895, in the "flatwoods" at Tampa, Florida, no. 2420a. A specimen in the Columbia University herbarium collected by Chapman belongs here; no. 3875 of Wright's Cuban Collection of 1865, distributed as *P. dichotomum* L., is also to be referred to this species.

The narrower leaves, more slender culms, and smaller and glabrous spikelets well distinguish this from *P. ciliatum* Ell., to which it is most nearly allied.

Gyrothyra, a new Genus of Hepaticae.

By Marshall A. Howe.

(Plates 302, 303.)

GYROTHYRA.

Stem creeping, foliose, subsimple or somewhat sparingly branching, radiculose. Leaves succubous, entire, alternate; underleaves present, free, bifid, segments narrowly lanceolate or subulate; walls of the leaf-cells with triangular thickenings at the angles. Antheridia short-stalked, in the axils of smaller saccate leaves, forming short median or, at first, terminal spikes. Involucral leaves 2–4 pairs (commonly 3 pairs). Perianth terminal, confluent for half its length or more with the bases of the involucral leaves, the greater part of the calyptra, and the tissues of the stem, to form a thick-walled tube (perigynium), with a small bulbous or saccate base; perigynium erect or ascending, making, at maturity, nearly a right angle with the stem. Capsule cylindrical, long-exserted, dehiscing spirally by four very long and slender valves; capsule-valves of two layers of cells, whose walls are wholly destitute of spiral, semiannular, or other local thickenings. Elaters free, bispiral,

acute or bluntly pointed; spores minutely papillate. "Involucellum" of the sporogonium foot well developed. (Name from γυρὸς, twisted, and θύρα, door.)

Gyrothyra Underwoodiana.

Dioicous. Plants rather large, 1–2 cm. long, 2–4 mm. wide, mostly in compact light green tufts; stems creeping, thick, often slightly flattened dorso-ventrally, .5–.65 mm. in diameter, about 15 cells wide in cross section, very densely radiculose, slightly ascending at apex, subsimple or with a few irregularly disposed lateral branches, in female plant innovating from near base of perigynium; root-hairs long, nearly colorless or of a dilute yellowish-brown hue, sometimes tinged proximally with purple, springing in older parts of the stem from oblong or linear dark-purple callosities, made up of the closely coherent root-hair bases and of other ventrally elongated cells; leaves obliquely inserted, lingulate or oval, succubous, rather close, translucent, alternate, scarcely decurrent dorsally, often crowded and suberect at stem apex, marginate, commonly concave below, apex decurved, 1.4–2 mm. × 1.7–4 mm.; cells of the margin quadrate or oblong, equalling in size the adjacent or twice as large; other leaf-cells mostly quite regularly pentagonal or hexagonal, 25–70 μ in diameter, oblong and larger towards the base; all with conspicuous trigones; under-leaves free, often wine-colored, .6–1 mm. long, bifid ½–⅔ the length into narrowly lanceolate or subulate segments, usually running out into a single series of cells at apex, concealed by the dense mat of root-hairs, except in the younger portions of the stem; perigynium tubular, 1–1½ mm. in diameter, and, with the free portion of the perianth, 3–4 mm. long, erect or ascending, nearly at right angles with the stem, tinged with purple ventrally, bulbous or saccate at base; wall of perigynium-tube 5–20 cells in thickness; involucral leaves 2–4 pairs (commonly 3 pairs), entire or repand, similar in form to the cauline, margins approximate at base dorsally, distant ventrally; uppermost pair inserted at about middle of perianth-tube or, more rarely, at two-thirds its height, erect, apex and dorsal margins narrowly reflexed and exposing the perianth, or closely appressed and wholly concealing it; next lower pair usually inserted at about one-third height of perianth-tube, more broadly reflexed; the one or two basal pairs but slightly attached to perigynium; involucral underleaves inconspicuous, sometimes subentire and slightly adherent to base of involucral leaves; bulbus of perigynium without radicles, but a dense tuft of root-hairs springs from the stem just back of the bulbus and long root-hairs come from the cells of the involucral leaves near their bases; perianth free for ⅓–½ its length, free portion nearly echlorophyllose, subtubular, some-

what inflated below, contracted and lax above, crenulate at mouth, 3–5 cells thick at juncture with perigynium-tube, 2 cells thick at mouth; calyptra fleshy, upper third or fourth free at maturity, 3–6 cells in thickness; archegonia several, the unfertilized raised on the base of the free portion of calyptra.

Capsule long-cylindrical; valves very slender, 3.3–6 mm.×.13–.17 mm., widely spreading when dry, attached spiro-radially to a basal disc composed of large hyaline cells, flexuous, contorted, or spiral, on moistening,—always with a spiral twist at the apex; foot of sporogonium forming a more or less goblet-shaped "involucellum"; seta 1½–2 cm. long; elaters bi-spiral, very rarely tri-spiral, acute or sub-obtuse, 210–420 × 12–15 μ; spores about 12 μ, minutely papillate.

Male plants more slender; antheridia (1–6) in the axils of smaller saccate leaves, forming spikes of 3–6 pairs of leaves decreasing in size upwards, appressed, apices patent or recurved, or, in uppermost pair, erect; antheridia ellipsoidal or pyriform, .15 × .24 mm., on pedicels ⅓ as long; slender stems (male?) occasionally gemmiferous at apex, gemmae unicellular, 10–24 μ in diameter.

Collected by the author on clay banks near Eureka, Humboldt Co., California, June, 1896; also by Prof. John Macoun (Herb. Underwood), on earth in a brook, Burrard Inlet, British Columbia, April 6, 1889, and on rocks, British Columbia, April 29, 1889.

The leaves of the British Columbia plants stand with their margins more often erect than in the California specimens, upon which our description and figures have been based. In the sterile condition, *Gyrothyra* somewhat resembles the larger forms of *Nardia scalaris*—also collected by Macoun on Vancouver Island (Can. Hep. 80)—but can readily be distinguished by the margined, lingulate, more translucent leaves and by the bifid underleaves.

The involucral leaves, though more or less apparently paired, are in a strict sense alternate like the cauline, and a single unpaired leaf is sometimes found to occur inside the pair we have described as the uppermost.

It should be remarked that but few capsules of the plant have been seen and that these were already open or so young as to be still enclosed within the calyptra, so the actual dehiscence has not been observed, but the extremely long valves, which on being soaked out take easily a position strongly suggestive of the paring of an apple, the spiro-radial attachment to the basal disc, the never failing spiral twist of the valve-apex, and the spiral lines

readily discernible on the surface of the embryo capsule (fig. 10) make, in the judgment of the writer, the induction that the dehiscence is spiral so safe and certain that he has felt no hesitation in so describing it and in basing the generic name upon this character. The absence of thickenings in the walls of the cells of the capsule valves is noteworthy. Schiffner states* of all the *Jungermaniaceae akrogynae:* "Die reife Kapsel besitzt eine aus 2 bis mehr Zellschichten bestehende Wand, deren Innenschicht in ihren Zellen stets Verdickungsleisten enthält." In *Gyrothyra*, the transverse walls of these cells usually appear a trifle thicker than the longitudinal, but the walls are otherwise wholly without traces of local thickening.

In respect to structure of the sporogonial envelopes, *Gyrothyra* is one of several very interesting transitions from the ordinary Jungermania type to the various pouch-bearing genera. Considered from this point of view and from certain other gametophytic characters, its nearest affinities are undoubtedly to be found in that section of *Nardia* represented by *Nardia haematosticta* (Nees) Lindb., of Europe. In manner of dehiscence of capsule it recalls the marsupiiferous genus *Kantia;* but the valves of *Gyrothyra* are much longer and their cell-walls lack the local thickening, while, of course, no generic comparison of the two can be made so far as the gametophyte is concerned.

It is with pleasure that the author associates with this novel plant the name of one who, by his numerous papers upon the American Hepaticae, as well as by his unfailing generosity, has placed the younger workers in the same field under lasting obligations. It should be noted that, although Professor Macoun's specimens were without the capsules, which reveal the distinctive generic character of *Gyrothyra*, Professor Underwood had already recognized that they represented something undescribed.

Explanation of Plates 302, 303.

1. Entire ♀ plant. × 5.
2. Cauline leaves. × 18.
3. Marginal and adjacent leaf-cells. × 225.
4. Transverse section through marginal portion of leaf. × 216.
5. Underleaves. × 24.

* Engler and Prantl, Nat. Pfl. Fam. 1: Abt. 3, 71.

6. Transverse sections of stem × 22, showing ventral callosity from which the root-hairs arise.

7. Antheridium. × 40.

8. Median sagittal section of perigynium and adjacent portions of stem, showing embryo sporogonium with capsule, seta, foot, and "involucellum," also unfertilized archegonia, perianth, insertion of involucral leaves, root-hair callosity, etc. × 23 (slightly schematized). The free part of the perianth as drawn here and in the next is proportionally rather too short and not sufficiently inflated below.

9. Sagittal section of mature perigynium from which the seta has been detached, showing fully developed calyptra and the unfertilized archegonia raised upon the base of its free portion, × 20 (slightly schematized).

10. Surface view of embryo capsule, exhibiting the spiral lines, which presumably bound the valves. × 50.

11. Valves of capsules, showing position taken by them when moistened. × 12.

12. Apex of a single valve. × 12.

13. Base of dehisced capsule from above, showing spiro-radial insertion of valves. × 36.

14. Cells of inner surface of capsule valve. × 150.

15. Elater and spores. × 137.

COLUMBIA UNIVERSITY, DEPARTMENT OF BOTANY,
April 9, 1897.

Notes on the American Hydnaceae.—I.

LUCIEN MARCUS UNDERWOOD.

KNEIFFIELLA.

The revival of *Kneiffia* Spach, Hist. Veg. Phan. 4 : 373, 1835, as a genus of Epilobiaceae, necessitates the selection of a new name for the hymenomycetous genus of the same name founded by Fries three years later.* The genus belongs with a group of resupinate plants usually classed with the Hydnaceae, but forming outliers from the typical members of the family in the direction of the simpler Tomentellaceae. Three species are reported from the United States and others are found in the West Indies and elsewhere. The synonymy of the American species is here recorded since it becomes necessary to use them in a publication elsewhere that might not be desirable as a medium of publishing new names since it has primarily a circulation that is not botanical.

* *Kneiffia* Fr. Epicrisis systematis Mycologici, 529. 1836–1838.

1. KNEIFFIELLA ASPERA.

Thelephora aspera Pers. Mycol. Europ. 1 : 153. (excl. icon.) 1822.
Thelephora setigera Fr. Elenchus, 1 : 208. 1828.*
Kneiffia setigera Fr. Epicrisis, 529. 1836–1838.

For this species which is the type of the genus, Fries adopts a name of his own, but at the same time cites in the synonymy an earlier name by Persoon, which it is proper to restore to its place in the necessary change of the genus.

2. KNEIFFIELLA CANDIDISSIMA.

Kneiffia candidissima B. & Rav. Grevillea, 1 : 147. 1873.

3. KNEIFFIELLA TESSULATA.

Kneiffia tessulata B. & C. Grevillea, 1 : 147. 1873.

The first named species appears to have a rather widespread distribution in the United States and Europe. The other two appear from present information to be southern in distribution, though much is still to be desired in regard to them.

Calkins reports *Kneiffia ambigua* Karst. from Florida (Journ. Mycol. 3 : 70), but I have seen no specimens.

March 9, 1897.

An undescribed Species of Kallstroemia from New Mexico.

BY ANNA MURRAY VAIL.

KALLSTROEMIA BRACHYSTYLIS.

A diffuse herb; stems prostrate, branched, slightly enlarged or swollen and very brittle at the nodes, sparingly pubescent with short appressed slightly twisted hairs, and fewer longer spreading cilia; stipules lanceolate to ovate-lanceolate, 4–5 mm. long, ciliate, at length caducous; petioles shorter than the leaflets; leaves 2–5 cm. long; leaflets 3–4 pairs, 6–15 mm. long, obliquely oblong or oval-oblong, slightly falcate, obtuse, or some of the lower ones acutish, ciliate on the margin above with somewhat stiff white hairs, paler, hirsute when young, at length glabrous beneath, the basal leaflets

* I cite the usual date given by Pritzel, Saccardo and others without the means at hand of verification. In my copy of Fries Systema, the "Elenchus" is bound in with volumes 1 and 2 and bears on the title page the date 1830 and the same title as the original Systema with the addition of "Supplementa voluminis, primi."

usually much smaller than the terminal ones; flowering peduncle 6 mm. long (or longer?), in fruit 1.5–2 cm. long, enlarged below the calyx; sepals lanceolate, caducous before maturing of the fruit; corolla orange-yellow, less than 1 cm. broad; fruit minutely pubescent, splitting into 10 1-seeded bony cocci, each with 2–4 very short obtuse tubercles or excrescences on the back, the persistent style 1–2 mm. long, very short and obtuse.

Mesa near Las Cruces, New Mexico, alt. 3900 feet. Collected by E. O. Wooton, August 12, 1895.

"New Mexico" C. Wright, no. 912, 1851, in Herb. Columbia University?

A species intermediate between *K. Californica* and *K. maxima*. It has the leaf form and general appearance of the latter species, the small flowers (though of a darker orange-yellow) and the caducous sepals of *K. Californica*. The specimen of Wright's collection, referred to above, is probably this species, but is too immature for certain determination; the young fruit has the short stout obtuse style which is one of the prominent characters of *K. brachystylis*.

To this species may possibly be referred a specimen from Guaymas, Mexico, collected by Dr. Edward Palmer, no. 107, 1887, and catalogued by Dr. Watson as *Tribulus maximus* var. in Proc. Am. Acad. **24**:43, but the fruit is too young for entirely satisfactory comparison.

New West Indian Fungi.

By J. B. Ellis and F. D. Kelsey.

The species here described were collected by Mr. A. E. Ricksecker, in the Island of St. Croix, Danish West Indies, January and February, 1896.

Asterina Colubrinae Ell. & Kelsey.

On leaves of *Colubrina reclinata*, no. 26.

Hypophyllous. Perithecia scattered, superficial, discoid, orbicular, grayish black, 200–275 μ diam., without any distinct mycelium; asci obovate, short-stipitate, 18–21 × 14–15 μ, without paraphyses, 8-spored; sporidia irregularly arranged, clavate, oblong, uniseptate, only slightly constricted, hyaline, 7–8 × 2–2½ μ.

Very near *A. stomatophora* E. & M. but perithecia larger and lacking the reticulate margin and asci, and sporidia somewhat smaller.

HYPOSPILA CORDIANA Ell. & Kelsey.

On leaves of *Cordia collococca.*

Perithecia sunk in the parenchyma of the leaf, small, globose, covered by a black suborbicular thin stromatic shield ½ mm. in diameter or less. These black stromatic specks are concentrically arranged and seated on pale yellowish bullate indefinite spots about ½ cm. diameter on the upper side of the leaf; asci clavate-cylindrical, short-stipitate, 8-spored (paraphysate?), 70–80 × 10–12 μ; sporidia biseriate, fusoid, 3–4-nucleate, greenish-hyaline, 15–20 × 3½–4 μ, mostly a little narrower and pointed below. No septa were seen but the nuclei indicate 3 septa, when mature.

The perithecia are very imperfect, hardly more than mere cavities, so that the fungus might with reason be referred to *Phyllachora.* Sometimes two or even three perithecia are covered by the same stromatic shield.

PUCCINIA VERNONIAE Cke. Grev. 10: 126.

On leaves of *Vernonia* sp.

II. Sori hypophyllous, rusty brown, ¼–½ mm. diameter, scattered, or collected on pale yellowish spots, visible on both sides of the leaf; uredospores subglobose, 20–22 μ, or elliptical, 22–27 × 20–22 μ, subtubercular-roughened, pale brown; teleutospores oblong-elliptical, 40–50 × 20–22 μ, only slightly constricted, epispore smooth and almost colorless, scarcely thickened above, but mostly with a narrow papilla which is often prolonged into a hyaline spike-shaped appendage 5–6 μ long, appearing like the remains of a broken pedicel.

Whether this is really *P. Vernoniae* Cke. cannot be certainly known from the imperfect description in Grevillea.

AECIDIELLA Ell. & Kelsey, n. gen.

Differs from *Aecidium* only in its uniseptate spores.

AECIDIELLA TRIUMFETTAE Ell. & Kel.

On leaves of *Triumfetta*, sp.

Spots light brown, 2–3 mm. diam., with a pale light yellow shaded border; pseudoperidia crowded on the spots, hypophyllous, short-cylindrical, rounded at the top, then truncate with the margin subentire, the component cells oblong or elliptic-oblong,

25–30 × 15–20 μ, punctate-scabrous; aecidiospores subglobose or obovate, often subangular, smooth, 20–23 × 15–20 μ, mostly uniseptate.

UREDO COMMELINACEA Ell. & Kelsey.

On leaves of *Commelina elegans.*

Sori amphigenous, scattered, or seated on suborbicular indefinite dead brownish spots, 3–5 mm. diam., covered by the epidermis which is raised into hemispherical ferruginous pustules ½–1 mm. diam., finally ruptured in the center and often umbilicate; spores echinulate, globose, 19–21 μ, or elliptical, 22–27 × 20–22 μ, ferruginous; the spots are subbullate.

U. Spegazzinii De Toni has larger smooth spores and *U. Commelinae* Kalch. smaller glabrous spores. Possibly this may belong to *Uromyces Commelinae* Cke.

UREDO GOUANIAE Ell. & Kelsey.

On leaves of *Gouania Domingensis.*

Sori hypophyllous, scattered, minute, hardly ½ mm. diam., rust-color, not on any definite spots, but the leaf, especially above, is mottled with light yellow indefinite spots; spores obovate-echinulate, pale brown, 22–27 × 18–20 μ.

A new Species of Clematis from Tennessee.

CLEMATIS GATTINGERI n. sp.

A perennial bright green vine. Stems angled, climbing over bushes and rocks, 1–3 meters long, densely glandular, considerably branched; leaves 1–1.5 dm. long, pinnate; petioles 2–4 cm. long, less densely glandular than the stem; leaflets membranous, lanceolate, or broadly lanceolate, 1.5–5 cm. long; more or less pilose and glandular on both sides, acute or somewhat acuminate, glandular-ciliate, subsessile, or short-petioluled, paler beneath than above; peduncles stoutish, 3–5 cm. long, glandular like the stem; bracts ovate, 5–10 mm. long; flowers purple, 10–13 mm. long; sepals elliptic or elliptic-lanceolate, felt-like, often recurved from the middle, crested near the sides below the apex, minutely pilose, ribbed, narrowed into caudate tips which are curled back; stamens pubescent; filaments longer than the anthers which are clothed with ascending hairs especially at the tips, achenes ovate-oval or elliptic, with an ovate or elliptic impression, 6–7 mm. long, minutely pubescent, the styles erect or nearly so, recurved from below the middle, 2–2.5 cm. long, plumose, tawny-green.

Banks of the Cumberland River, near Nashville, Tennessee. Summer.

A remarkable and handsome little species of *Clematis*, a member of the section Viorna, and, although more closely related to *Clematis Viorna* than to any other of its relatives, it is not very suggestive of that species. Dr. A. Gattinger, for whom it is named, discovered some plants on the banks of the Cumberland river, above Nashville, Tennessee, several years ago. He at once saw that it was different from any other species with which he was acquainted; he collected specimens and grew the species in his garden, where the plants have since thrived, the species holding all the characters it exhibited in its native habitat.

The slender habit, the densely glandular pubescence of its foliage, the small flowers with caudate sepals and the short plumose styles all serve to separate *Clematis Gattingeri* from *Clematis Viorna*.

J. K. SMALL.

Reviews.

Flora of the Southern United States. By A. W. Chapman. Third Edition. Pp. 655. Cambridge, 1897.

It is now over thirty years since the first edition of Chapman's Southern Flora was given to the public; and during this time the author has had the satisfaction of seeing his work become and remain the standard text-book of systematic botany for the region involved. At an advanced age, Dr. Chapman has just brought to completion a third edition of his flora, successfully capping a botanical career covering nearly three-quarters of a century, and he is entitled to the hearty congratulations of botanists throughout the country, by whom he is universally held in affection and esteem.

The book has been entirely reprinted from fresh plates, and the typography and superior grade of paper employed are altogether satisfactory. A hasty proof-reading has however resulted in a number of unfortunate typographical errors, as *Pimpernella*, *Anemorella*, etc. It is gratifying to observe that the substance of the long appendix to the second edition has been properly incorpo-

rated in the text, so that students will no longer need to search for a given species under two distinct headings.

In the style of presentation and in nomenclature, Dr. Chapman adheres closely to old traditions, preferring group-characters interspersed through the specific descriptions rather than artificial keys placed at the commencement of a genus, the usage in most modern systematic works. The disadvantage of the former method is the difficulty which the eye encounters in correlating two or more headings when confused by an intricate maze of daggers and asterisks. Yet the task of constructing systematic keys where none had previously existed would have been too great a labor to undertake in a work intended primarily as a revision. Neither could Dr. Chapman be expected to undertake the bibliographical research necessary to place the nomenclature of his flora on a modern basis. But it is to be regretted that he did not see fit to make such corrections as recent studies have shown to be essential, such as the substitution of *Anemone quinquefolia* L. for the European *A. nemorosa*, and of *Viola tenella* Muhl., for *V. tricolor* var. *arvensis* DC. Many of these changes were made even in the first fascicle of Gray's Synoptical Flora, issued last year, and thus certainly bear the stamp of conservative authority.

The lack of all system in the employment of citations is, as it has always been, a defect in this work. Botanical bibliography has now assumed such enormous proportions that full citations should be given wherever possible; and in a manual in which space does not permit the practice, careful attention should be bestowed on the verification of references. Dr. Chapman indicates new species for the most part by an appended "*n. sp.*," but occasionally these receive no indication whatever, as in *Eupatorium incisum*, requiring an inspection of all the other editions to ascertain that the plant is here described for the first time. The absence of an authority in general signifies a new name given to an old species, as "*Viburnum molle* Michx., var.? *tomentosum*," the synonym cited being "*V. scabrellum* Flora," and the reader being left to infer that the "Flora" mentioned is an earlier edition of the same work, and not the name of a botanist.

In his earlier writings Dr. Chapman was inclined to be more liberal than his contemporaries with regard to generic limitations,

recognizing such genera as *Atragene*, *Conoclinium*, *Diplopappus*, *Leptopoda*, *Quamoclit*, *Batatas* and *Pharbitis*. He has now adopted a more conservative view, uniting all the above mentioned genera and many others, with their nearest allies; in this, however, he is by no means consistent, for we find *Hepatica* included in *Anemone*, while *Actinomeris* is distinguished from *Verbesina* and if *Otophylla* and *Dasystoma* are both to be separated from *Gerardia*, *Monniera*, in the same family, should most certainly be removed from *Herpestis*, and *Sophronanthe* from *Gratiola*.

About a dozen new species and innumerable varieties are described in the course of the work, several of them being unpublished names of Dr. Engelmann and other writers. The author has adhered to a rigid rule of exclusion in connection with the numerous new forms proposed during the last few years by other students of southern botany, remarking in the preface, "In a region so vast * * * * there still must remain much to reward the labors of future explorers, and many new species have been proposed by recent collectors as occurring within my limits. These, which are unknown to me, when duly confirmed, * * * * will have place in future issues."

As a future issue embracing any extended revision is a matter of some uncertainty, it is to be deplored that Dr. Chapman did not make some effort to obtain material for examination at least in those genera in which he himself contemplated the establishment of new species. The omission of these well-marked forms is less of an injustice to the botanists who have devoted time and careful study to the plants than it is to the field student who constantly discovers specimens which he cannot match with any of those described. It would be difficult for the chance collector of *Clematis Addisonii* to reconcile it with the diagnosis of *C. Viorna*, or *Nolina Brittoniana* with that of *N. Georgiana;* and yet there is no other recourse for one who is dependent upon this flora alone. We are glad to note, however, that many excellent species of Buckley, Curtis and Shuttleworth, long suppressed by other writers, have been properly reinstated by Dr. Chapman. The chief annoyance to botanists resultant from the omission of recently described species will be the addition to an already overburdened synonymy which some of the very numerous new varieties must make.

Such defects as these, are, however, attributable rather to the conditions under which the work was carried out than to any intentional discrimination on the part of the author. A revision can never assume the proportions of an entirely new book; and the attempt to remodel every feature of a portrait often destroys the likeness. At least until the production of some more comprehensive and more modern volume Dr. Chapman's flora will be indispensable to every student of southern botany.

C. L. P.

Catalogue of the Hanbury Herbarium, in the Museum of the Pharmaceutical Society of Great Britain. Pp. 160. Compiled by E. M. Holmes, Curator of the Museum. Published by the Society.

The Daniel Hanbury Herbarium was donated to the Pharmaceutical Society of Great Britain by Mr. Thomas Hanbury, brother of its deceased owner, on condition that it be kept separate from all other collections, and carefully guarded. Thus maintained, it has been of the greatest service, not only to British pharmaceutical botanists, but to many foreigners who have visited it, or who have sent specimens for comparison to its learned and obliging curator.

The families represented in the Catalogue are arranged in the Benthamian sequence, while the species in each are arranged alphabetically. The specimens under each species are lettered, the character of each indicated and the locality and date of collection stated. Notes and extracts from letters which accompany the specimens in the herbarium are also printed. Most of these are by the collectors, but in many cases they represent critical correspondence concerning them from specialists. The number of species catalogued is 610, the number of specimens probably three times as great. Appendix No. 1 is a list of books quoted in the herbarium, No. 2, a list of the herbaria so referred to, and there is a copious index giving the common as well as the botanical names. There is no need of such a catalogue as this in the United States, as we have no such collection on any extensive scale.

H. H. R.

Demonstration of Absorption of Carbon Dioxide and of the Generation of Oxygen by Diatoms. By T. Chalkley Palmer. Proc. Acad. Nat. Sciences, Phila. F. 1897.

This paper describes a method of demonstrating the normal process of carbon dioxide assimilation in diatoms. It rests upon a color test and is substantially as follows: A dish of suitable size and shape is filled with spring water tinted pale red by a solution of haematoxylin. A glass tube is filled with this solution, its mouth closed with a rubber stopper in which a quill tube is inserted and the whole hung over the dish so the quill tube dips under the surface. Carbon dioxide from the lungs is blown into the remainder of the water in the dish until it loses its reddish tint and becomes brown. Two tubes are now filled with this water, into one of which a few clean living diatoms are put. Both tubes are corked and hung in the same manner as the first. On exposing the apparatus to a bright light, gas rises in the tube containing the diatoms and at the same time the color of the liquid begins to change. In about fifteen minutes it is pale red like that in the first tube, the color deepens until it is blood red, showing that the carbon dioxide has disappeared and oxidation has taken place. The diatoms used for this experiment were the long filamentous forms of *Eunotia*, *E. major* of Rabenhorst. E. L. G.

Beiträge zur Moosflora von Nord-Amerika. Dr. Julius Roell. Hedwigia, 36: 41–66. 1897.

This is an enumeration of several collections sent to Dr. Roell from Ohio, Michigan, Wisconsin, Indiana, Arkansas, Missouri, Washington, Labrador and Greenland, with four species collected by himself at New Durham, New Jersey. It includes long critical notes on several species of *Sphagnum*, especially *F. Austini* Sull. and its forms, and the following new species and varieties: *Dicranum Miquelonense* var. *crispatulum*, *Meesia tristicha* var. *Purpusii*; *Plagiothecium Roesii* Hpe. (*P. Sullivantiae* Sch.) var. *longifolium* Roell; *Hypnum* (*Campylium*) *simulatum* Kindb., *Hypnum pratense* var. *Purpusii* Roell; *Dicranum flagellare* var. *brevifolium* Roell; *Thuidium lignicola* var. *Roellii* Ren. & Card.; *Hypnum arcuatum* var. *ramosum* Roell; *Eurhynchium strigosum* var. *robustum* Roell; *Fontinalis denticulata* Kindb.; *Hypnum fluitans* var.

excurrentinerve Kindb.; *Sphagnum Mendocinum* var. *recurvum* Roell; *S. platyphyllum* var. *molluscum* Roell; and *Weisia Grönlandica* Kindb. The range of several species is greatly extended, notably *Dicranum Miquelonense*, *D. Canadense* and *Mnium decurrens* from New Jersey; *Cylindrothecium concinnum* from Michigan; *Leucobryum sediforme*, *Fissidens Garberi*, *Leptotrichum Schimperi*, *Webera Lescuriana*, *Atrichum xanthopelma*, *Hypnum Coloradense* and *Amblystegium distantifolium* Kindb. from Hot Springs, Arkansas.

E. G. B.

Nouvelles Contributions a la Flore Bryologique du Bresil. V. F. Brotherus. Bih. till K. Sv. Vet.-Akad. Handl. **21**: 1–76. 1895.

This contribution includes an enumeration of the collections of M. Mosen, N. Puiggari, W. Schwacke and others. The author has availed himself of the studies on the flora of Brazil made by Duby, Geheeb and Hampe; has received special assistance from Ch. Müller, and has brought together a list of 70 genera and about 300 species including 65 new ones in the following genera: *Amblystegium*, *Anomodon*, *Bryum*, *Campylopus*, *Catharinea*, *Cryphaea*, *Distichophyllum*, *Entodon*, *Eustichia*, *Fissidens*, *Helicodontium*, *Hookeria*, *Hyophila*, *Hypnum*, *Isopterygium*, *Lepidopilum*, *Leucobryum*, *Leucoloma*, *Leucomium*, *Macromitrium*, *Microthamnium*, *Mniadelphus*, *Neckera*, *Papillaria*, *Pilotrichella*, *Prionodon*, *Rhaphidostegium*, *Stereodon*, *Syrrhopodon*, *Thuidium and Trichosteleum.* The largest number of species are found in the genera *Fissidens* and *Hookeria*, with *Campylopus*, *Papillaria*, *Rhaphidostegium* and *Syrrhopodon* also represented by numerous species.

E. G. B.

Die Laubmoose. K. G. Limpricht. Rab. Kryptfl. **4**: (3) 129-256. 1897.

This includes parts 29–30 beginning with the remainder of the *Brachythecium*s, describing the two varieties of *B. rivulare* and recognizing *B. latifolium.* *Bryhnia* and *Hyocomium* do not include any American species. Of the four species of *Scleropodium* three are American, including *H. purum*; in *Eurhynchium* there are only 7 out of 22, of these *E. cirrhosum* is described with fruit and three varieties are recognized. In *Rhynchostegium* the only American species, *R. rusciforme*, is described with five varieties, and in *Raphi-*

dostegium, *R. demissum* is figured. The subgenus *Rhynchostegiella* is raised to generic rank with 5 species, of which *H. curvisetum* has been found in America.

E. G. B.

Recherches sur les Bacteriacees fossiles. By M. B. Renault. Ann. Sci. Nat. **65**: 275–349. *pl. 46.* 1896.

Until recent years the most ancient known bacteria were those discovered in the bones and teeth of Egyptian mummies. In 1879 M. Van Tieghem noted their existence in remains of fossil plants from the environs of St. Etienne. M. Renault in this learned and interesting study describes and illustrates numerous species preserved in animal and vegetable fossil remains from various parts of France.

A. M. V.

Proceedings of the Club.

TUESDAY EVENING, MARCH 9, 1897.

There were 32 persons present, President Brown presiding.

The Secretary read a letter stating conditions of a grant of money offered from the Newberry research fund. This letter was from Dr. N. L. Britton as Secretary of the Council of the Scientific Alliance of New York, and indicated that the award for the present year is to be in Geology or Paleontology, to amount to $50, payable July 15, 1897. The award applies to researches yet to be begun or completed, and which are to be embodied in a paper submitted to the Council within three months from the present notification. Each society within the Scientific Alliance is invited to nominate a recipient.

The scientific program was then taken up, the evening being devoted to the subject of Ferns with papers as follows:

1. Mrs. Elizabeth G. Britton, "Notes on some Mexican Ferns," presented, in Mrs. Britton's absence, by Dr. Rusby, with exhibition of numerous specimens, including species of *Pellaea*, *Polypodium*, *Cystopteris* and *Cheilanthes*. Dr. Rusby, having been himself present at their collection, described vividly the tongues of hard, black lava on which the collectors walked, and which was

filled with large cavities often forming caves, containing some accumulation of soil and crowded with a luxuriant growth of ferns, although in November and practically the winter season.

2. Mr. Willard N. Clute, "The New York Stations for *Scolopendrium*." Mr. Clute contrasted the wide distribution of the Hart's-tongue Fern in the old world, from Great Britain to Japan, with the extremely local North American occurrence, in five areas only, Mexico, Tennessee, Central New York, Owen Sound in Ontario, and New Brunswick. The Central New York locality was made known early in the present century by Pursh in July, 1807, who found it five miles west of Syracuse on the farm of J. Geddes, where it has recently been rediscovered. About 1827 Wm. Cooper discovered it at Chittenango Falls, where Mr. Clute found hundreds of plants growing last summer. Mr. Clute described the Chittenango ravine and its ferns. On sunny exposures of the limestone walls of the ravine grow rue spleenwort and purple cliff-brake in quantities; in shady places, the slender cliff-brake; on the talus, upon the larger bowlders, the walking fern, and in the shade of these bowlders, the *Scolopendrium*, with fronds chiefly in clusters of 6 to 12, at first erect, finally somewhat drooping. The spores are ripe in September. Mr. Clute added that the species seems to be increasing at present, being now under the protection of an association.

Prof. Burgess remarked upon the former scarcity of the fern in that locality as reported to him by Dr. Torrey, of Chittenango, about 1874, and by Dr. Morong, who could find none at his visit about 1876.

Prof. Underwood spoke of the Jamesville locality, also on the corniferous limestone in Onondaga County, where 20 years ago he found it quite common about two small lakes, but becoming soon exhausted as the one most frequently visited. He queried why it should not occur at other ledges of the corniferous limestone throughout western New York, and why it should confine itself to that rock here, while in England it frequents sandstone, shale and limestone indifferently. Dr. Britton then remarked that in Europe (and Nova Scotia) *Campanula rotundifolia* grows in meadows, but here on rocks; *Cerastium arvense* also grows in Europe in fields, but here on rocks.

Dr. Britton said that *Scolopendrium* is probably a case like that of *Sequoia* and *Brasenia* of originally much wider distribution, where the isolated plants owe their survival to favorable conditions. He cited *Epipactis* among orchids as a parallel in distribution, confined here to central New York and Ontario, but widespread in the old world.

Mr. Benj. D. Gilbert added an interesting comparison of the growth of *Scolopendrium* at stations where he had collected it at Jamesville and Chittenango Falls, also in southern France, northern Italy, and Undercliff in the Isle of Wight. In the warm shelter of the latter place, it is more luxuriant than anywhere else, showing great tendency to sport, displaying forking tips and deeply cordate bases, as at Chittenango Falls.

3. The third paper was by Mr. B. D. Gilbert, of Utica, N. Y., entitled, "New and interesting Ferns from Bolivia," with exhibition of specimens of two new ferns, a *Blechnum* and a *Dryopteris*, the first peculiar in being fully pinnate, the second in being a one-sided dwarf persistently under a foot and a-half high, instead of 4 or 5 feet as its type. The paper will be printed in the BULLETIN

4. The fourth paper, also by Mr. Gilbert, "Jamaica, the Fern-Lover's Paradise," described the abundance of species and of individuals which the speaker had collected there, illustrating the subject by numerous specimens. He remarked that Swartz in his *Species Filicum*, 1783–86, enumerating all then known ferns, described 709 species, of which 140 were from Jamaica; the Jamaican number was raised to 300 by Grisebach and now to 500 by resident botanists there, an estimate confirmed by Mr. Gilbert.

Probably no other equal area produces half that number. Among reasons which account for this are the warm latitude of Jamaica, its south shore sheltered from cooler breezes by a mountain-wall, its mountains themselves rising to 7,000 feet and reaching into a cool temperate climate, and its great variation in moisture, with daily rains in the mountains and sometimes but twice in six months on the plain. Mr. Gilbert described in particular his experiences with the tree-ferns reached by a long journey on foot, high in the Blue mountains, there forming unmixed groves, their stems supplying the only wood readily obtainable. One, *Alsophila armata*, reaches 50 feet in height, though its slen-

der stem is but a few inches in diameter. No class of ferns is as yet so poorly described as the tree-ferns; description should be from the living specimen and at the locality; the only such in English are those in Thwaites' Flora of Ceylon. Jamaica is remarkable in particular for its numerous Filmy Ferns, 26 species (out of 280 known); these are all in the three eastern parishes. In the east part *Blechnum occidentale* is the common fern of the roadsides; *Polypodium reptans* was seen everywhere, now growing erect; one bank 30x25 feet, was completely covered with *Gleichenia pectinacea*. The great number of endemic species is surprising; as if the work of differentiation had gone on there with greater activity and vital power than anywhere else in the world; every genus in Jamaica shows one or more endemic species.

Mr. Gilbert closed by exhibiting specimens of three new species from Jamaica, belonging to *Asplenium*, *Dryopteris* and *Polypodium*, and also of a number of rare species as *Entomosora Campbellii*, *Gymnogramma schizophylla* and *Adiantum Candollei*. His paper was discussed by President Brown, Prof. Underwood and Dr. Rusby, the latter referring to the uses made of tree-ferns in New Zealand, as compared with the use for timber and for posts in Jamaica.

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